THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Indications in the iron market have not been as promising in the past week as was to be looked for in the wake of the good rail buying of a few weeks previous. The long delayed buying movemnet, for which the time has been set repeatedly in the past few weeks, is still in the future, and is now discussed with less confidence than at any time since the high point was reached. Actual developments of the past week are the third reduction of prices by associated Southern furnaces, lower quotations on Northern pig iron in Eastern and Central Western markets, lower prices for bar iron, and an attitude on the part of buyers in all lines that points to a lower basis before any free buying can be recorded. There are increasing indications that production is in excess of consumption, and without trying to locate the point at which some blast furnaces must blow out if the descent goes on, the policy of buyers argues a belief that the swing is still to be in their favor. Something may be inferred of the effect of high prices in stimulating production by the output of Southern blast furnaces on July 1, which was at a weekly rate of about 51,000 tons, as against about 43,000 tons in March, 1902, when Southern No. 2 was sold at $12, and at a profit. Part of the increase comes, too, from the most modern furnace in the South, and from improvements to the stacks of the largest producers. The reduction of No. 2 foundry to $13.50 by the Chicago meeting of associated furnaces last Friday is not more significant than the previous reduction to $15, the market having already fixed a lower level in both cases. Buyers now talk $12 and will buy little while they wait. Pig iron stock figures for July 1 showed an accumulation in June of about 50,000 tons and for the past six months of about 150,000. Production is now at the rate of 21,500,000 tons a year. Further indication of the trend of things appears in the noticeable easing in the supply of labor in foundries and machine shops, and new wage demands now under consideration find employers more unwilling to yield than at any time since the boom set in. The steel market is a shade lower, $28 and $29 at mill for Bessemer and open-hearth billets respectively being the present basis. German billets are offered at $27 to $27.50 duty paid at Atlantic port, but no large lots are sought. Bar iron shows further weakness. Various local mills are selling at 1.65c to 1.70c in ordinary lots at Central Western points, and the lower figure has been cut where any considerable order was up. The sheet situation seems to maintain itself at prices recently quoted, which appear to be about the limit for independent producers. Rails sold at Chicago to the extent of 50,000 tons in the week, but smaller railroads are not in a hurry to follow the lead of the big lines. Some scattering importations are heard of to take care of early work, some of these rails going to the Pacific Coast. The outcome of the long negotiated sale of the Clairton Steel Co. to the United States Steel Corporation comes this week. The steel corporation buys a half interest, and besides getting needed additional steel supply cuts down the proportion of Clairton steel that goes upon the open market to one-eighth of the output.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, July 15.

The action of the Southern furnace association at their meeting in Chicago last Friday, by which they again reduced the "official" prices, has caused a great deal of adverse comment in Pittsburg, and the general expression is that the attempt to maintain official prices, and particularly reducing these prices at intervals, has not only not served to induce consumers to come into the market, but has encouraged them to stay out. It is pointed out that so far foundries have not been ready to buy at any figure, but that if the market were left to itself they would be likely to begin buying within a few weeks.

A report has been going the rounds that about a week ago the leading steel mills held a meeting at which the price of billets and sheet bars was fixed. No such meeting was held, but the fact is that for a long time the leading producers have been working in very close harmony in the matter of crude steel, and have kept each other accurately advised as to what they were doing. By this means several attempts to break the market have been averted, prospective buyers in such cases reporting to steel mills negotiations alleged to have been entered into with other producers, when the fact was that the other mill had not been approached at all. It appears it was the discovery of this harmony of action which formed the basis for the report that the mills had just come together. A report has also gained some circulation that a certain local producer sold 15,000 tons of high carbon billets for Detroit at $26 at mill. The facts are that the sale was only of 5,000 tons, and at about $29 at mill.

Some weakness has developed in corrugated roofing, there being offers of this material at 10 cents a square below the recognized market. It cannot be learned that any producers are naming cut prices, and the supposition is that the material offered is at second hand. It is known that one or two dealers have more material coming to them than they can dispose of in the regular channels, as this is the dull season. The regular prices on carload lots, No. 28 gauge, 2½-inch corrugations, are $2.10 per square for painted and $3.35 for galvanized, a square being 100 square feet, and weighing, for No. 28 gauge painted, nominally 69 pounds.

There are reports of further shading on galvanized sheets, but none on black. It appears that the leading interest has not recognized any change in the market on these lines, and it is believed that this indicates that any shading must be at second hand only, and for limited quantities.

The movement in plates, shapes and merchant bars shows a slight further improvement, and mills are all quite comfortably employed. There is no sign of any change of prices, except in bar iron, which is lower.

The machinists' scale for the Pittsburg district was

settled last Saturday, the employers giving an advance of 7½ percent in wages, and some minor concessions, including two extra holidays, New Year's Day and Decoration Day, on which double time shall be paid, also increasing the pay for shop work on Sundays from time and a half to double time. There is nothing new in the molders' situation, since the secret ballot of last Friday, which was again in favor of a strike. This vote was taken for the information of the national officers now in session in Cincinnati, who will determine whether to authorize a strike in this district. There is now very little likelihood that there will be a strike of molders.

Pig Iron.—The new "official" prices on Southern iron are as follows, delivered Pittsburg, the freight being $4.85: No. 1, $18.85; No. 2, $18.35; No. 3, $17.85; No. 4, $17.35; gray forge, $17.10. It is not likely that any iron will be sold locally at these figures as they hardly represent anything lower than could be done on Northern iron on a firm offer. The market for Northern iron is characterized by an almost entire absence of buying, foundries not yet being at the end of their string, rolling mills being shut down, and steel works being pretty well covered for the month. There has been a little offering of Bessemer by outside furnaces at lower prices, such as $17.70, Ironton, and some small lots could be picked up at $19 or lower, delivered Pittsburg, while the Valley furnaces are quoting about the same range as formerly. We revise prices as follows:

Bessemer, Valley	$18 50 to 18 75
Bessemer, Pittsburg	19 00 to 19 60
No. 1 Foundry	18 75 to 19 00
No. 2 Foundry	18 25 to 18 75
Gray Forge, Pittsburg	18 00 to 18 25
Chilled Basic, Valley	18 75 to 19 00
Chilled Basic, Pittsburg	19 60 to 19 85

Steel.—Business in billets and sheet bars has quieted down as most consumers are now well covered for the immediate future. Prices are firmly held at the same level as formerly ruling, $28 on Bessemer and $29 on open-hearth at mill, with from $1 to $2 advance on sheet and tin bars. Some odd sales of small lots of sheet bars are reported at somewhat higher figures. We note a sale of 5,000 tons of high carbon open-hearth billets from .90 to 1.10 percent carbon, at about $29 at mill. Wire rods are held at $36.50, Pittsburg, in small lots.

Ferro-Manganese.—There is no change in ferro, and we quote $50 in large lots and $52.50 in ordinary small lots, delivered east of St. Louis.

Muck Bar.—The market continues very quiet, mills quoting about $32, delivered Pittsburg, for good local brands.

Skelp.—The market has become quite inactive, as consumers are well covered, and a number of producers are also sold up. We quote prices unchanged as follows, on ordinary lots: Iron, grooved, 1.90c; sheared, 1.95c to 2c; steel, grooved, 1.95c; sheared, 2c. On a desirable order these prices might be shaded slightly.

Bars.—Mills are getting a good run of business on steel bars, which helps to make up for some slowness in specifications. On iron bars inquiry, which has been quite dull for some time, is looking up, as consumers gradually get their old contracts worked off. Recent quotations have been on the steel basis, Pittsburg, and in the Central West independent mills have been quoting low prices in their own localities. The Eastern mills are generally quoting 1.70c at mill, while farther Western mills quote 1.65c. We quote the market as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron 1.65c to 1.70c, Youngstown, with freight added to point of delivery from Youngstown. The following differentials maintain: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

Pipes and Tubes.—The remarkable strength of this market continues, mills being sold up close to the end of the year on large sizes, and being well filled for the next few months on smaller sizes. There is no sign of weakness at any point, and on some large sizes it is impossible to get quotations at all. We continue to quote as follows in carload lots to consumers, f. o. b. Pittsburg, plus freight according to Tube Rate Book to destination:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Wrought Iron Pipe. Black. Percent.	Wrought Iron Pipe. Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	69	59	66	56
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	52	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	65	53	61	50
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52
¾ to 6 inch	72	61	69	58
7 to 12 inch	66	54	62	51
Extra Strong Plain End				
⅛ to 8 inch	67	57	63	53
Threads only	66	56	62	52
Threads and Couplings	65	55	61	51
Double Extra Strong Plain End				
½ to 8 inch	59	49	55	45
Threads only	58	48	54	44
Threads and Couplings	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¼ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¼ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	68

Rails and Track Material.—Some further order have been booked by the rail mills for standard rails. It is believed that important buying is over for the present, or until the usual time for contracting comes around, which is ordinarily near the end of the year. The light rail trade this year has been a disappointment to the mills which last summer got very high prices for their product. In the past three months light rails have gone off from $5 to $7 a ton, owing partly to lower prices for re-rolling rails and partly to mills using new material entering the market more actively. We quote: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 8 pounds, in carload lots, $39; less than carload lots, $40; 12 pounds, $38; 16 and 20 pounds, $36; 25 to 40 pounds, $36. Track materials: Spikes, 2.15c to 2.20c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 2c to 2.10c is asked.

Plates.—The situation is unchanged, mills going along about as formerly, with a fair run of current orders for small lots, and fairly good specifying on old contracts. Official prices are strictly maintained as follows: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches 5c extra 100 pounds. Plate 3-16-inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Structural Material.—The market is fairly active. We repeat quotations as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—Further cutting on galvanized sheets is reported, but it appears that none of the mills are willing to

do less than the regular price, and it is believed that any cutting in the market is being done by some jobbers who have a little more than they can dispose of. On black sheets the market seems absolutely firm. We quote official prices on contracts for 500-bundle lots and over as follows: No. 28, 2.75c; No. 27, 2.65c; No. 26, 2.55c; Nos. 22 and 24, 2.45c; Nos. 18 and 20, 2.35c; Nos. 14 and 16, 2.25c; Nos. 10 and 12, 2.10c to 2.15c. Galvanized: No. 16, 2.60c; No. 18, 2.85c; No. 26, 3.35c; No. 27, 3.60c; No. 28, 3.85c; No. 29, 4.35c; No. 30, 4.50c.

Wire and Nails.—Mills are very firm in their prices, which seems to be due not so much to their being behind on orders as that they realize it is necessary to protect unfilled contracts, as on new business quite good deliveries can be had. It must be remembered that, with the exception of galvanized, the advances this year have restored to the market all but $1 a ton of the cuts made last fall, which gives rise to some expectation that the market may go off a little this fall again. We continue to quote: Wire nails, carload lots, to jobbers, f. o b. cars, Pittsburg, $2; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30; staples, carload lots, $2.20. Galvanizing, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.15, and less than carload lots, $2.20 f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.25 in carload lots and $2.30 in less than carload lots Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—There is nothing new in this line, and we repeat former quotations as follows: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots. Tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. Tool steel is quoted 7 cents and upwards, according to the grade.

Spelter.—This metal is rather scarce and the market remains at 5.63½c, Pittsburg, for spot or July shipment from the west.

Old Material.—There is a trifle more business in scrap, but the market is still far from active, as consumers are still holding off. We note one or two sales of crop ends at $20.50, and a little ordinary melting stock at $20. No. 1 cast scrap is still nominally $17.50 to $18 and sheet scrap $16.75. There is a little figuring on rolling mill scrap contracts for second half.

Coke.—The wide spread between standard Connellsville and various outside grades of coke continues. There seem to be a great many who do not realize how scarce the standard article is, such producers quoting $3 at ovens on furnace and $3.50 on 72-hour foundry, and being entirely indifferent whether they book business or not. Empties have been scarce in the Connellsville region, and production has had to be curtailed. Outside coke is being moved without difficulty. On various outside brands we note prices from $2.50 down to $2 for main line furnace coke, while coke in other districts is offered at less than $2. For a fairly good outside grade of foundry coke the market is $2.50 to $3.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, July 14.

It is said that two distinct views existed concerning the reduction in the price of Southern pig iron, which was made in this city on Friday last week. There were producing interests, which held to the view that $12 for No. 3 should be made; others that $13 for that grade would be the proper quotation. The former element, for the present at least, has held in abeyance its judgment regarding the level that will secure business. Large producers are now quoting Southern iron on the basis of $13 for No. 3, a reduction of $1.50 from the previous nominal level, though actually not quite down to the prices at which some iron had previously been sold. Nos. 1 and 2 are respectively $1 and 50 cents higher than the $13 base price; No. 4, gray forge, mottled and white, respectively 50 cents, 75 cents, and $1.25, below the price of No. 3.

There has also been some weakness in steel in this market, not by leading interests, but on the products of some of the smaller plants. It is believed, however, that few if any billets are now offered at the same prices at which these sales were made.

Perhaps the tendency of bars, structural material, sheets and old material are also toward a lower level, though not markedly so. There is not quite the consumption of iron and steel in the West this month that has been a common record recently. A number of mills have been closed down for repairs, so that production is lessened. But the developments of the past week have not been wholly of a declining nature. The buying of steel rails was fairly good, some 50,000 tons having been placed for 1904 deliveries. Were the consumers of iron and steel buying in the ordinary manner, a good round tonnage would now be booked by makers. But buyers almost with one accord are holding off stubbornly, buying nothing ahead for more than a few weeks' requirements. This gives the market a duller appearance than rightfully belongs to it.

Pig Iron.—One of the claims said to have been made by those Southern producing interests who urged last Friday that the new basis should be $12 for No. 3, was that that quotation would within 48 hours be followed by the purchase of 100,000 tons of iron and within three or four days more of several hundred thousand tons. These figures were doubtless based upon some needs the size and urgency of which could be accurately measured. But the new scale of prices has as yet had practically no effect upon buying. There is a much better inquiry for iron, much of it vaguely defined, but all representing positive needs. The West has been extensively circularized upon the new quotations, but the actual buying consequent thereupon has been very slender, the transactions being oftener below than above 100 tons. There is said to be a quite general belief among the foundry trade in the West, that iron will go to $12 or $12.50 for No. 2. And just now there is also expression of an intention to buy liberally for future wants if quotations are made on that basis. One lot of 500 tons of No. 1 Southern foundry, three months deliveries, was bought at $18.35, Chicago. This was one of the largest transactions strictly on the new schedule of prices. Southern iron has been offered freely within the past week, or since the new schedule was announced, at a reduction of 50 cents or at $13, Birmingham, for No. 2, and it is said to have been offered even lower, for heavy tonnages.

There has been better buying of Northern irons than for a long time. Several good contracts have been placed for the last half for foundry and malleable use. Prices of local irons have dropped somewhat, but not to the level of the Southern products. The indications of a buying movement among the Northern products are becoming very pronounced. All the foundries at Moline, Ill., one of the largest Western centers for the consumption of pig iron, are reported to be closed on account of a molders' strike. The foundrymen are said to be organized and determined to maintain their position to the end. In some other directions there is a falling off in the melting of iron, but it is not necessarily for more than brief duration. Revised quotations are as follows:

Lake Superior charcoal	23 00 to 24 00
Local Coke Foundry No. 1	19 00 to 19 50
Local Coke Foundry No. 2	18 50 to 19 00
Local Coke Foundry No. 3	18 00 to 18 50
Local Scotch Foundry No. 1	19 00 to 19 50
Southern Coke No. 1	18 10 to 18 35
Southern Coke No. 2	17 60 to 17 85
Southern Coke No. 3	17 10 to 17 35
Southern Coke No. 4	16 60 to 16 85
Southern No. 1 soft	18 10 to 18 35
Southern No. 2 soft	17 60 to 17 85
Southern Gray Forge	16 35 to 16 60
Southern Silveries (4% to 5% silicon)	18 85 to 19 10
Southern Silveries (5% to 6% silicon)	19 35 to 19 60
Jackson Co. Silveries (6% to 8% silicon)	22 30 to 23 30
Jackson Co. Silveries (8% to 10% silicon)	23 30 to 24 30
Ohio Strong Softeners	21 50 to 22 00
Alabama and Georgia Car Wheel	26 25 to 27 25
Malleable Bessemer	19 50 to 20 00
Basic iron	17 85 to 18 35

Bars.—There is quite a demand for both iron and steel bars from the country in small lots, Chicago orders being relatively few. There are no heavy tonnages purchased. While steel bars are firm, iron is perhaps slightly lower. Iron bars are still selling as high as 1.75c from mill and at 1.70c in larger quantities, but there are also reported

to be mill quotations on large lots as low as 1.65c. From store iron still commands a premium over steel. We quote mill shipments, Chicago delivery, Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c; iron, 1.70c to 1.75c. Quotations from store, steel, 2c; iron, 2.10c; hoops, 2.40c to 2.50c; angles, 2.25c rates.

Sheets.—From store the price of light sheets has slightly declined in some quarters, though not all. The cheaper sheets are the product of some of the smaller mills. Galvanized is steady. We quote mill shipments, carload lots, Chicago delivery, as follows: No. 27 black, 2.80c to 2.90c; No. 28, black, 2.90c to 3c. Galvanized 75 and 10 percent. On lots from store, we quote No. 27 black, 2.95c to 3c; No. 28 black, 3.05c to 3.10c. Galvanized, 75 percent to 75 and 2½ percent.

Structural Steel.—The contract for the McNeil building, Jackson Boulevard, to replace one recently burned, has been let. It will require about 900 tons. The contract for the large warehouse for Carson, Pirie, Scott & Co. has also been let, though it is not decided whether the structure will be of steel or mill construction. There is a fair call for shapes from store, but the trade is not specially eventful. We quote mill prices, Chicago delivery: Beams and channels, 16 inches and under, 1.75c; 18 inches and over, 1.85c; universal plates, 1.75c; angles, 3x3 and larger, 1.75c; tees, 3x3 and larger, 1.80c; zees, 1.75c. Lots from store, 2¼c per pound.

Plates.—There is a good inquiry for plates and shipments are being made steadily on contracts. Prices are firm. We quote mill prices, Chicago delivery, as follows: Tank steel, ¼ inch and heavier, 1.75c; flange steel, 1.85c. Prices for lots from stock: Tank steel, ¼ inch and heavier, 2.15c to 2.25c; 3-16, 2.25c to 2.35c; No. 8, 2.30c to 2.40c; No. 10, 2.35c to 2.45c; flange steel, 2.40c to 2.50c.

Rails and Track Supplies.—The tonnage previously booked for 1904 delivery has been increased during the past week by about 50,000 tons, and there are inquiries in the market for quite a number of smaller requirements running up to 5,000 tons each. Second quality rails and relayers are meeting with a brisk demand for near-by use. We quote standard sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; rails, 25 to 40 pounds, $32 to $34; 12 pounds, $39 to $40; regular differentials for intermediate sizes. Track supplies, mill shipments: Angle bars, 2c to 2.10c; spikes, first quality, 2.25c (out of store, carload lots, 2.35c to 2.45c rates); second quality, 2.10c; track bolts, 3½x¾, with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3c to 3.10c, with usual differentials for other sizes.

Merchant Steel.—Contracts for the new season proceed fairly well. Several have been just closed for lots of 200 to 300 tons. Prices are without change. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.30c to 2.40c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 and 10 percent higher; cold rolled shafting, carload lots, 47 percent off; less than carload lots, 42 percent off.

Merchant Pipe.—The demand for large sizes of pipe continues brisk and mills are steadily busy. Prices are well maintained. We quote carload lots mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ to ⅜ in. inclusive	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	71.85	61.85
7 to 12 inches, inclusive	67.35	57.35	64.35	54.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—There has been a normal call for boiler tubes and the market is steady. Prices are without change. Our quotations below are on carload lots, mill shipments, f. o. b. Chicago. On less than carload lots, 12½ percent is to be added:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in.	43.35	38.35
1¾ to 2½ in.	55.85	35.85
2¾ to 5 in.	60.85	45.85
6 to 13 in.	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in.	40	35
1¾ to 2½ in.	50	32½
2¾ to 5 in.	57½	42½
6 to 13 in.	50	32½

Cast Iron Pipe.—The aggregate business in cast pipe has been improving slightly, though there have been no large contracts to report. There is this week no change in the prices for small lots; car loads are quoted, f. o. b. Chicago, 4-inch water pipe, $33; 6-inch, $32; 8-inch and upwards, $31; gas pipe, $1 a ton higher.

Billets and Wire Rods.—Some lots of steel billets have been sold during the past ten days at concessions from previous quotations and the general level is from 50 cents to $1 lower. Bessemer billets are nominally $30 to $31. There have been sales of open-hearth in Ohio territory on the basis of $30.75 at consumer's mill. Forging billets have been more active in Chicago territory and quotations are $33 to $36, according to quantity. Wire rods are $39 to $40.

Wire and Wire Nails.—There has been a steady trade in small lots throughout the West, the aggregate being very satisfactory. Quotations to jobbers, Chicago delivery, are as follows: Wire nails, carload lots, $2.20; less than carload lots, $2.30. Cut nails, steel, carload lots, $2.26½; less than carload lots, $2.36½. Plain wire, $2.10 carloads, and $2.20 in smaller lots; galvanized, carloads, $2.40; smaller lots, $2.50. Barbed wire, carloads, $2.50; less than carloads, $2.60; galvanized, carloads, $2.80; less than carloads, $2.90; staples, carloads, $2.30; smaller lots, $2.40; galvanized, carloads, $2.60; small lots, $2.70. Bale ties, 80 and 20 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Coke.—The coke market is peculiar and disappointing. The products from the best operations in the Connellsville district are selling here on the basis of $3.50 to $3.75 at ovens, but "Connellsville" coke, foundry grade, is also offered at about $2.75 or higher. There are Connellsville operations, the output of which has heretofore been disposed of in the East for furnace and other purposes but which, because the owners neglected last January, during the flush times to close contracts for the future, are now trying to market their product to the foundry trade in the West. The coke is said to be unsatisfactory, but the general name sells it till trouble and loss arise from the use thereof. There is little buying of coke just now at any figure.

Old Material.—There has been little change in prices this week. For 1,000 tons of stove plate it is said $10 was offered. Turnings have been somewhat stronger on account of a scarcity, possibly temporary. But the general drift of the market is downward. Some of the railroad lists are said to have brought above $16 for No. 1 railroad wrought, but the price was regarded as high. Considerable irregularity exists. Dealers' selling prices in gross tons follow:

Old iron rails	$20 00 to 21 00
Old steel rails (mixed lengths)	16 50 to 17 00
Old steel rails (long lengths)	19 00 to 20 00
Relaying rails	29 50 to 30 00
Old wheels	19 50 to 20 00
Heavy melting steel	15 50 to 16 50
Mixed country steel	12 50 to 13 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$15 00 to 16 50
No. 2 R. R. wrought	14 00 to 15 00
Shafting	15 50 to 16 50
Dealers' forge No. 1	12 50 to 13 50
No. 1 busheling and wrought pipe	12 00 to 12 50
No. 1 cast	14 00 to 15 00
Heavy cast (300 pounds and over)	10 00 to 10 50
Country malleable	12 50 to 13 00
Iron axles	19 50 to 20 50
Steel axles	17 00 to 17 50
Cast borings	5 50 to 6 00
Mixed borings, etc	5 50 to 6 00
Wrought turnings	12 00 to 12 50
Machine shop turnings	12 00 to 12 50
Iron axle turnings	12 50 to 13 00

Steel axle turnings	12 00 to 12 50
Stove plate and light cast scrap	9 00 to 10 00
Old iron splice bars	16 00 to 17 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, July 15.

The summer shutdown of mills has indicated the condition of the market in various lines. Those rolling iron stopped as a rule about July 1 and will not resume until Aug. 1, and the market has been dull and weak. On the contrary, mills producing sheets, plates, tin plate, and pipe have hardly taken any rest; in some cases, the shutdown was only for July 4 and 5, because these mills have had about all they could do.

Iron Ore.—Furnacemen are not showing any disposition to buy and some say they have enough ore to meet their requirements until spring. The U. S. Steel Corporation is taking to its furnaces about 60 percent of the ore shipped from Lake Superior mines. Dispatch is now very good. Freight rates are stationary at 80 cents from the head of the lakes, 72½ cents from Marquette and 60 from Escanaba.

Pig Iron.—The action of Southern associated furnaces in fixing $13.50 as the price at Birmingham for No. 2 foundry is being condemned by sellers, including agents who handle Southern iron. It was fully expected that the Chicago meeting would make $12 the base and it is said that some members favored that price. It is anticipated that, unless the strike of coal miners in the South is settled within a couple of weeks, some of the furnaces will be compelled to bank and the resulting curtailment of production may stop further reduction in prices. No business of consequence is expected to result from the latest action of the association. Inquiries for Northern iron are more numerous and the outlook is more encouraging. There is very little spot Northern iron on the market. An agent who had an order for 100 tons of No. 2 foundry for prompt delivery this week had considerable difficulty in finding the iron. This sale was made on a basis of $17.75. Youngstown, or $18.60, Cleveland. Foundrymen manifest considerable interest in the market and admit that their stocks are running pretty low. Considerable buying is expected soon, but foundrymen will probably not cover for more than 60 to 90 days. We quote, f. o. b. Cleveland, with the exception of gray forge, which is quoted at Valley furnace:

Bessemer	$19 35 to 19 85
No. 1 Strong Foundry	19 35 to 19 60
No. 2 Strong Foundry	18 60 to 18 85
No. 3 Foundry	18 10 to 18 35
Scotch No. 1	19 35 to 19 85
Scotch No. 2	18 60 to 18 85
Gray Forge, Valley furnace	18 00 to 18 25
Lake Superior charcoal	23 00 to 23 50

Coke.—The market for genuine Connellsville foundry coke is firm at $3.50, but Klondike and other grades are selling at considerably less. Delivery is not so prompt and complaints about scarcity of cars are again heard.

Finished Material.—A feature in finished materials is the sharp competition in nuts and bolts, which has resulted in much lower prices and considerable demoralization of business. Bar iron is weak and it is becoming constantly more apparent that the demand in many districts is being met by local mills. Instead of basing the price on Pittsburg or Youngstown, these local mills quote for home delivery, the usual quotation in Toledo, Chicago, St. Louis and other cities being about 1.70c on small lots, as it is in Cleveland. Quotations to small consumers are based on the steel price of 1.60c, Pittsburg, and on large lots this has been cut quite sharply. Agricultural interests in Ohio have been making contracts for steel bars rather freely of late. The price remains 1.60c for Bessemer and 1.70c for open-hearth, Pittsburg. The demand for structural material, except for bridge building purposes, is light. This condition is attributed largely to strikes and the high cost of materials other than iron and steel. Jobbers report excellent business out of store for nearly all materials as compared with earlier months of the year. Steel bars are selling at 1.80c to 1.90c out of store and iron at 1.90c to 2c. There is good demand for sheets and independent mills are apparently content to get what business they can at the prices of the principal producer. The prices of the principal producer through jobbers continue as follows: Galvanized sheets, mill sales, carload lots, Nos. 10 and 11, 2.60c; Nos. 12-14, 2.70c; Nos. 18 to 21, 3c; Nos. 22 to 24, 3.20c; Nos. 25 and 26, 3.55c; No. 27, 3.80c; No. 28, 4.05c; No. 29, 4.45c; No. 30, 4.95c. Galvanized sheets out of stock are quoted 75 and 5 off. For 3-16-inch black sheets and heavier we quote 2.15c, Cleveland. Mill sales of black sheets to consumers are made on the following basis: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c. The following are prices out of stock: No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50 to 2.60c; No. 16, 2.60c to 2.70c; Nos. 18-20, 2.75c to 2.85c; Nos. 22-24, 2.85c to 2.95c; Nos. 25-26, 2.95c to 3.05c; No. 27, 3.05c to 3.15c; No. 28, 3.15c to 3.25c.

Old Material.—Hundreds of tons of steel scrap delivered on old contracts have recently been rejected at Sharon, Pa., on the ground that they did not come up to specifications and dealers in this locality are having much trouble of the same kind, as prices have fallen since contracts were made. Nearly all old contracts have now expired, however, and none are being renewed, on account of the uncertainty as to prices. A buying movement is expected about the time the mills now closed resume. We quote as follows, f. o. b. Cleveland, all gross tons:

Old iron rails	$21 50 to 22 00
Old steel rails (over 6 feet)	20 00 to 20 50
Old steel rails (6 feet and under)	17 50 to 18 00
Old car wheels	19 50 to 20 00
No. 1 R. R. wrought	15 00 to 16 00
Mill scrap	16 00 to 17 00
No. 1 machine cast scrap	14 50 to 15 00
Iron axles	24 00 to 25 00
Steel axles	25 00 to 26 00
Axle turnings	15 00 to 16 00
Wrought turnings (free from cast)	14 00 to 15 00
Cast borings	9 00 to 9 50
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	14 00 to 15 00
Grate bars	12 00 to 12 00
Pipes and flues (clean)	16 00 to 17 00
Tank iron	16 00 to 17 00
Hoop and band iron	12 00 to 12 50
Sheet iron	11 00 to 12 00
Wrought drillings	14 00 to 15 00
Malleable iron (railroad)	18 50 to 19 00
Malleable iron (agricultural)	15 00 to 15 50
Stove plate	11 00 to 12 00
Heavy steel	18 00 to 18 50

CINCINNATI.

July 14

The coke market is a rather unsettled affair. It is difficult to locate prices with exactness. The best grades of Connellsville foundry coke are quoted from $3.25 to $3.50 f. o. b. ovens. Buyers are not buying ahead and orders are mainly for current needs. Some spot coke is obtainable at close to $3 ovens. General trade is not active.

Pig. Iron.—The event of the week was the fixing of a new schedule by the association of Southern furnaces at a meeting in Chicago on July 10. The new schedule is a reduction of $1.50 per ton from the prices agreed upon at the Birmingham meeting of June 2. The associated furnaces are now quoting as follows:

No. 1 foundry and No. 1 soft	$14 00	Birmingham
No. 2 foundry and No. 2 soft	13 50	Birmingham
No. 3 foundry	13 00	Birmingham
No. 4 foundry	12 50	Birmingham
Gray forge	12 25	Birmingham
Mottled	12 00	Birmingham
White	11 50	Birmingham

The new schedule practically meets the actual prices at which business has been going, although there were some sales on a $13 Birmingham basis prior to the adoption of the new figures. It is not believed here that the new basis will have any effect on the market or make any change in the action of the independent furnaces. It is generally accepted that 50c per ton off the schedule can be done, and the situation is in no way improved. Buyers are still maintaining their waiting attitude and take only small lots for immediate requirements. Sales agents are not advising purchases for future needs. The actual market is again in the hands of the independent furnaces and it remains to be seen how much further the decline will be carried by them in the competition for the little business offering. So far as can be learned

there are now no large inquiries pending. The Northern furnaces are also showing a tendency to accept lower prices and in the Ironton district $16 for No. 2 foundry has been done. It is intimated that iron is now getting down to a basis where there is not much profit to sacrifice and cost of production is being figured. So far as actual business is concerned the inquiries show no particular improvement, but it is naturally expected that consumers will be wanting more and more prompt shipment iron, as their deliveries on old contracts are being completed and it is noticed that on most of the orders placed, consumers are asking for prompt shipment, which indicates that they are using up their yard supplies as close as they dare before ordering. We quote the market for delivery f. o. b. Cincinnati:

Southern Foundry No. 1	$16 75 to 17 25
Southern Foundry No. 2	16 25 to 16 75
Southern Foundry No. 3	15 75 to 16 25
Southern Foundry No. 4	15 25 to 15 75
Southern Foundry No. 1 soft	16 75 to 17 25
Southern Foundry No. 2 soft	16 25 to 16 75
Gray forge	14 50 to 15 00
Northern Foundry No. 1	17 65 to 18 15
Northern Foundry No. 2	17 15 to 17 65
Southern car wheel iron	26 25 to 27 25

Finished Material.—The situation is unchanged. Orders are mainly for small lots, but as buyers have only been taking enough for current needs for some time past the small orders aggregate a good volume of business. The tendency is to hold off in view of the decline in pig iron. Structural shapes in a jobbing way are moving freely. In bar iron $1.70 base can be done on any large business offering, but the ruling quotation is $1.73 base the same as for steel. Iron bars, car lots, are quoted at $1.73 to $1.75 base, half extras. Steel bars remain at 1.73c base, half extras, with the retail price 2c base, half extras, for both out of store. Galvanized sheets are being quoted at 75 and 5 percent off. We quote black sheets No. 27 at 2.78c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.10c; No. 27, 3.20c; No. 16, 2.65c; No. 14, 2.55c; No. 12, 2.45c; No. 10, 2.35c. Tank plates are firm and sell out of store at 2.15c for ¼-inch and 2.25c for 3-16-inch. Beams and channels are quoted at 2.15c to 2.25c from stock, and angles at 2.15c and 2.25c for base sizes. The merchant pipe market holds steady and unchanged with a firm tone prevailing under good demand. We quote:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	63.7	53.7
½ inch	68.7	58.7	65.7	55.7
¾ to 6 inch, inclusive	73.7	63.7	70.7	60.7
7 to 12 inch, inclusive	67.7	57.7	64.7	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	35.2
1¾ to 2½ inch	54.2	34.2
2¾ to 5 inch	59.7	44.2
6 to 13 inch	54.2	34.2

Old Material.—The market is decidedly irregular and the quotations ruling are difficult to locate. Melters are buying sparingly and dealers are timid about making offers. Melters do not hesitate to make any kind of a low bid and the market is dull and weak with a declining tendency. We quote:

Old No. 1 railroad wrought, net tons	$14 50 to 15 50
Cast machine and foundry, net tons	12 00 to 13 00
Old iron rails, gross tons	21 00 to 22 00
Old steel rails, gross tons	18 00 to 19 00
Old short lengths, gross tons	15 00 to 16 00
Old iron axles, net tons	21 00 to 22 00
Stove plate, net tons	10 00 to 11 00
Wrought turnings, net tons	12 50 to 13 50
Cast borings, net tons	7 00 to 8 00

PHILADELPHIA.

July 14.

Buyers are not yet showing any disposition to come into the market except for immediate requirements. In some lines there is still a large amount of business on the books, but the volume of new business is very small. The effort of the steel corporation to stimulate the market by buying Bessemer iron at $19.35, Pittsburg, and the later efforts of Southern pig iron producers have failed and it is becoming apparent that a period of overproduction has been reached. Many mills are closed for taking stock, making repairs, for hot weather and other reasons, but it is not expected that they will be in a hurry to resume.

Pig Iron.—Business is very dull and no sales except in small lots are being made. Prices are unsettled, but from $18.50 to $19 is the usual quotation for No. 2. Foreign iron cannot be imported at present prices. We quote: No. 2 X foundry $18.50 to $19, No. 2 plain $17.75 to $18.25, gray forge standard $18 to $18.25, ordinary gray forge $17 to $17.25, basic $18 to $18.25.

Steel.—Few sales are being made, the price being from $29 to $30.

Finished Material.—Many mills are not in operation. Prospects are not encouraging. Prices are irregular, and not very strong at the figures named as follows: Plates—Small lots, 1.90c to 1.95c; carload lots, ¼-inch and thicker, 1.75c to 1.80c; universals, 1.80c; flange, 2c; marine, 2.10c to 2.15c; fire box 2.20c to 2.25c. Bars—In carloads are usually quoted at 1.70c to 1.75c for refined iron and 1.70c to 1.75c for steel bars. Beams, angles and channels, ordinary sizes are 1.73½c to 1.80c for carload lots, with the usual addition for small quantities.

Old Material.—There is no improvement in demand and prices are largely nominal. We quote: Old steel rails $19 to $20, miscellaneous heavy steel scrap $19 to $19.50, low phosphorus scrap $26 to $27, old steel axles $21.50 to $22.50, old iron axles, nominal, $24 to $25; old iron rails $22 to $23, old car wheels, nominal, $21.50 to $22, choice scrap railroad No. 1 wrought $18.50 to $19.50, country scrap $17 to $17.50, machinery cast $17 to $17.50, No. 2 light scrap (forge) $17 to $18, No. 2 light scrap (ordinary) $13 to $14, wrought turnings $14 to $14.50, wrought turnings, choice heavy, $15 to $15.50; cast borings, $9.50 to $10, stove plate, $12.50 to $13.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., July 14.

Pig Iron.—The pig iron market here is in a transition state, with buyers not yet having given any decided indication of the attitude they will take on the schedule of prices adopted by the associated Southern furnaces on Friday. The course of many buyers will be determined by what the independent furnaces will do. If the latter continue selling at recessions, the belief is that the market will continue in the waiting position which has characterized it for months. We hear of an inquiry bringing a $12.90 offer for No. 2 Southern foundry at Birmingham, with a large tonnage involved. Sales agents expect little business for the time being, but think the outlook bright for the closing of some good contracts for extended delivery in a week or so. Northern irons have displayed considerable weakness recently, and current prices are the lowest that have prevailed this year. New business is eagerly sought, and generally closed at receding prices. Foreign irons no longer command any attention, and both inquiries and sales have ceased for the time being. New York prices are as follows: Northern No. 1X, $18.50@$18.75; No. 2X, $18.00@$18.25; No. 2 plain, $17.75@$18.00; Southern No. 1 foundry, $18.00@$18.25; No. 2 foundry, $17.50@$17.75; No. 3 foundry, $17.00@$17.25; No. 4 foundry, $16.25@$16.50.

Billets.—Importations of German basic billets have practically ceased, home mills being able to meet all domestic demands. Lots of 5,000 tons of German steel can easily be had for immediate delivery at from $27 to $27.25, duty paid, which is the lowest price foreign billets have reached in some time.

Finished Iron and Steel.—The finished material market in general is in an unsettled condition, due to labor troubles on one hand, and on the other to the belief that lower prices of pig iron will bring easier conditions in all lines. The prolonged strike in the building trades in this city, whch was thought a few days ago to be over, is still causing apprehension, some of the men returning to work, while others are still out. The American Bridge Co. says new business in small lots is coming in satisfactorily, and it has no difficulty in getting its price. The company has a new contract for 4,500 tons about closed. With inde-

pendent interests trade is not so good. Plates, according to our authority, are as vulnerable now as they were strong at the opening of the year. Mills are seeking new orders with some eagerness. Bars are lower, and reliable quotations are impossible to obtain. Sheets are fairly steady, with only a moderate business doing. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; firebox, 2.30c to 2.50c; refined iron bars, 1.75c to 1.80c; soft steel bars, 1.70c to 1.75c; steel sheets, in carloads, New York, No. 28, black, 2.90c to 3.05c; galvanized 75 and 2½ off.

BIRMINGHAM, ALA.

July 14.

The principal feature of the iron market the past week was the reduction of iron by some of the Southern manufacturers to a basis of $13.50 per ton for No. 2 Foundry, f. o. b. cars Birmingham, making the Birmingham basis for different grades as follows:

No. 1 Foundry	$14 00
No. 2 Foundry	13 50
No. 1 Soft	14 00
No. 2 Soft	13 50
No. 3 Foundry	13 00
No. 4 Foundry	12 50
Gray Forge	12 25
Mottled	12 00

At this writing little or no business has developed on the new basis, and it remains to be seen whether prices have yet "touched bottom." It is well known that on this basis there is no great profit to such furnaces as have to depend on the market for their supplies of raw material, and it is doubtful if there are many furnaces in the district that, with present high cost of labor in all departments, could successfully operate for any length of time should prices go much lower. It seems, therefore, that the attention of producers must first be directed to the question of costs and that a policy of retrenchment will be adopted all around. It is well known that there has been some considerable increase in the stocks of iron on Southern yards the past few weeks; still, some interests are inclined to stack more iron on their yards, it seems, rather than go lower than the prices now established, arguing that in view of the continued heavy consumption, and with the prospects good for large crops and consequent increased tonnage for the railroads, the demand will be much better for the remainder of the year, with prices on a reasonable level.

There are no new developments in the coal mining situation. The miners do not seem disposed to accept the proposition of the operators, and now with a further reduction in iron there is, of course, no probability of any better offer being made to induce a resumption of mining. Influences are said to be at work that will result in the re-convening of the joint conference this week to consider some agreement. Some few miners have left this territory for other fields, but the bulk of them are taking a very quiet vacation at their respective camps. There have been no reports of disorder from any source.

One of the furnaces of the Woodstock Iron Works was blown in today, after having been idle for a number of weeks. These furnaces obtain their principal supply of coke from the mines at Newcastle which are operated by non-union labor. In fact, these ovens are the only ones in blast at this time, except those supplied with coal mined by convicts. A. H. Quinn has resigned his position as assistant treasurer of the Woodstock Iron Works, and it is understood the present auditor, C. A. Allis, will succeed him.

The Sterling Dynamite Co. will shortly complete the erection of its plant near Boyles. This plant will be operated, it is understood, by the Du Pont Powder Co. interests.

Two stacks of the Tennessee Coal, Iron & Railroad Co. were banked for a few days the past week—not for lack of fuel, but because of inability to get sufficient limestone quarried for flux, owing to excess of water at some of its quarries. It is understood the trouble was only temporary.

It is expected that the Vanderbilt furnace of the Tutwiler Coal, Coke & Iron Co. will be put out of blast this week, in order to make repairs while the coal miners are idle. At all the mines in the district general repairs are being made, tipples overhauled and improved, boilers and engines are being thoroughly repaired and everything put in readiness for heavy duty when work shall be resumed, which no one anticipates will be later than the last week of the current month.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, No. 150 NASSAU ST., July 14.

Pig Tin.—General market conditions remain unchanged, with a tendency to lower prices asserting itself. New business is at a low ebb, and it is thought that unless more of it is forthcoming in the near future, lower prices will prevail. During the past week, the market, on the whole, was weak, and such advances as did occur, were of short duration. The London market declined during the week, after it had shown much strength. Closing prices at the Metal Exchange today were as follows: Spot to July, 27.40c to 27.60c; August, 27.25 to 27.50c. London closed today as follows: Spot, £124 15s; futures, £122. Arrivals at Atlantic ports to date amount to 1,230 tons, with 2,055 tons afloat.

Copper.—The belief in lower prices has taken hold so firmly, that trade is practically at a standstill. Prices are being shaded so frequently in the open market, that it would seem as if buyers were dictating them. Many think the situation is shaping itself for still lower values. The London market has been in a depressed condition during the week, and prices were lower. The export trade is getting worse with the passage of each month. Closing prices at the Metal Exchange today were as follows: Large and electrolytic, 13¾c to 14c; casting, 13¼c to 13½c. London's closings today follow: Spot, £56 15s; futures, £56 5s. Exports for the month to date aggregate 1,778 tons, against 3,728 tons for the same period last year.

Lead.—Unchanged here at 4.12½c for carload lots. St. Louis is slightly stronger at 4.00c to 4.02½c. London is still £11 8s 9d.

Spelter.—Spot is scarce and stronger at 6c to 6.12½c. St. Louis is firm at 5.60c. London is a shade higher at £20 17s 6d.

Antimony.—Cookson's is 7½c nominal, with lower prices probable. Other grades are weaker, Hallet's being 6½c, and outside brands, 6¼c.

Quicksilver.—Still quoted at $47.50 per flask of 76½ pounds in lots of 100 flasks. London unchanged at £8 2s 6d.

Nickel.—Is selling at 40c to 47c for large lots down to a ton, and 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK July 14.

During the semi-annual inventory, consumers have been cleaning up their plants and consuming the scrap copper thus accumulated, decreasing the call for new stock. Prices are somewhat lower. Lake has been sold at 14c in carload lots, smaller quantities at 14⅜c to 14½c. Casting at 13¾c car loads, and 14¼c small lots. Pig tin is quoted: Pig tin, 29½c; pig lead, 4.10c in 50 to 100-ton lots, and 5c to 5¼c in lesser quantities; spelter, 6c in carload lots, and 6½c in lesser quantities; sheet zinc, 6¾c; antimony, 10¾c to 11c for Cookson's, and 9¾c for Hallet's. We quote old metals as follows: Copper wire, 11¾c; heavy copper, 11¾c; light copper, 10⅝c; heavy red brass, 12c; light brass, 10⅝c; red turnings, 9½c; yellow turnings, 7½c.

The Burt Machine Co., Baltimore, Md., succeeds The Burt Labeling Machine Co., manufacturer of wrapping, labeling and lacquering machines, and will extend the business. New equipment will not be required at present.

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JULY 16, 1903

THE CAMPAIGN OF NEW CONSTRUCTION OVER.

One feature that will be missed now that the campaign of consolidation-making is ended for an indefinite time, is the liberal outlay for improvements that followed the launching of each new combine. In many cases months were consumed in the preliminaries of bringing various competing companies together and meantime the outlay of money for additions and improvements was at a minimum. But the merger once decided upon, one of the first duties of the new management was to select plants at which extensions could most economically be made preparatory to the concentration of manufacturing operations at the best located works. In many cases liberal provision was made in the underwriting plans for the raising of cash that would be immediately available for new work, the abandonment of unfit plants and the centralizing of manufacture being often emphasized as a main factor in the increased earning power promised under the new arrangement. The past four years have thus put many millions of syndicate funds at the disposal of operating departments in a great variety of manufacturing lines, and converted such capital into real estate and plant.

The importance of this new work as a factor in the country's recent prosperity can scarcely be estimated, but that its absence now will be severely felt need only be pointed out to be appreciated. In the iron trade tens of millions have been expended in the building of new plants and the extension and modernizing of old since the consolidations became a factor in 1898. Engineering firms whose boards have been full for four years have been made painfully aware in recent months of the fact that the period of new construction is ended for the time being. The United States Steel Corporation employs its own engineering staff on the extensive program of new construction for which its bond issue is made, so that the general engineering trade is not in touch with it; but even here it is understood that some changes looking to a curtailment of the original plans have been made recently.

Next to the engineering concerns the halt in new construction for iron and steel production falls heaviest upon builders of engines and other rolling mill and steel works equipment. Operations in these lines is slacking off steadily and while there is a good run of work in the shops, very little is coming upon the books to take its place.

The developments of the past year have borne heavily upon the independent producers of various forms of finished material who depend upon the open market for their steel supply. The data presented in *The Iron Trade Review* of July 31, 1902, concerning new sheet, tin plate, pipe and bar mills under construction showed that a very considerable tonnage would be added to the country's annual production in these lines if all the projects then under way were carried to completion. But the scarcity and high price of steel in the past 12 months, and the reductions in prices of certain finished materials by the steel corporation last fall, while steel has held up steadily until within the past few weeks, have left little margin for such concerns. Some of them have ceased operations after a brief career; others have failed to carry out their original plans of construction, while yet others still maintain themselves, though admittedly with little or no profit and only the barest prospect of keeping a footing. Such enterprises have been rendered less promising by the absorption by the steel corporation of two large independent steel works early this year, while in the case of a third a deal has just been consummated by which the steel corporation secures half its output.

The situation as it exists today is exceedingly unpromising for the initiation of any important new construction in iron and steel lines for many months. Capacity is plainly beyond consumption in many forms of finished material; that the same will be said of pig iron and steel in the near future scarcely admits of doubt.

In the common pleas court of Lawrence Co., O., the Pocahontas Co. has brought action against the Lawrence Furnace Co. to recover $10,036.88, claimed to be due for coke.

The installation of a large machinery plant at the Hartford mine, Negaunee, is now completed, and it will handle the product when the Hartford becomes what everybody is sure it is—a large property. This summer many improvements have been made on surface, to facilitate and cheapen mining operations and these are also now complete.

The Cherry Valley Iron Co., of Pittsburg, will erect two new blast furnaces, one at West Middlesex, Pa., and the other at Leetonia, O. The new stack at West Middlesex will be 17x70 feet. This will be built beside the present stack. The furnace will have a daily capacity of about 250 tons, and the output will be Bessemer iron. The new stack at Leetonia, O., will be 18½x80 feet, and will be located just beside the present furnace. Both the present stacks will be torn down when the new ones are completed. The Riter-Conley Mfg. Co., of Pittsburg, has the contract for the iron work.

One of the large trunk lines has just placed an order for 10,000 tons of heavy steel rails for the Pacific Coast. The house of Arthur Koppel, 66-68 Broad St., New York City, has secured this order and several other large ones for other roads.

Drake & Stratton Co., large stripping contractors, are to erect a large machine shop at Hibbing, covering about 5,500 square feet of ground. It will be equipped for repairing steam shovels and lighter machinery.

Steel Corporation Buys Into the Clairton Steel Co.

(Special Telegram.)

PITTSBURG, July 15.—At a meeting of the board of directors of the Crucible Steel Co. of America held here yesterday the sale of one-half interest in the Clairton Steel Co. to the United States Steel Corporation was ratified.

The Crucible Steel Co. of America retains a one-fourth interest, while the Oliver Iron & Steel Co. and W. P. Snyder & Co. have the remaining fourth interest. The sale of this property to the United States Steel Corporation has been pending for the past half year, but, owing to the demand of the Crucible Steel Co. of America that it be assured a permanent source of steel supply and of W. P. Snyder & Co. of a supply for sale in the open market no arrangement could be arrived at until recently, satisfactory to all parties concerned.

According to the terms of the sale the United States Steel Corporation will pay into the treasury of the Crucible Steel Co. of America $4,000,000 in cash and the Oliver & Snyder interests will pay the sum of $2,000,000, making $6,000,000 in all. The amount of stock outstanding, which was all held by the Crucible Steel Co. of America until this sale was consummated, was $3,500,000 and the par value of the bonds issued up to date is $10,250,000, bearing 5 percent interest. Thus according to the terms of the deal the valuation of the Clairton property is placed at $18,250,000. While the officers of the company claim that the total expenditure for the erection of the plant and ore properties amounts to only $12,500,000, nearly all of the bonds issued by the Clairton company were sold below par, the company realizing little more than $9,250,000 from their sale.

The product of the company is to be divided among the various interests as follows: United States Steel Corporation, one-half; Crucible Steel Co. of America, one-fourth; W. P. Snyder & Co., one-eighth, and the Oliver Iron & Steel Co., one-eighth. There is to be no change in the management of the Clairton Steel Co. W. P. Snyder will be re-elected president at the organization meeting to be held shortly. Geo. L. Brown, at present secretary and treasurer, will be continued as secretary and a new treasurer will be elected.

The present daily output of pig iron from the two furnaces of the Clairton plant amounts to about 1,000 tons, while the output of the steel plant ranges from 900 to 1,000 tons a day.

The steel corporation will thus secure at once an additional supply of steel amounting to nearly 500 tons daily and half of all the pig iron not used in the open-hearth furnaces. At present only ten of the twelve 50-ton open-hearth furnaces are being operated and the daily output will easily reach 1,200 tons when all are in operation. A third blast furnace is now under construction and will be completed within a few months. The daily output of iron will then reach fully 1,500 tons and as no more than 900 tons will be used in the operation of the open-hearth furnaces the steel corporation will receive 300 tons of pig iron daily for use in its other plants. Most of the steel corporation's share of steel from the Clairton plant will be consumed in the Monessen plants of the American Steel & Wire Co. and the American Steel Hoop Co., as these are located only a few miles from Clairton on the Monongahela River.

Steel was first made at the Clairton plant on Sept. 8, 1902 and as the Crucible Steel Co. of America does not take more than 250 or 300 tons daily the remaining tonnage was sold in the open market. Since the first of the year the amount marketed has amounted to 600 to 700 tons daily. W. P. Snyder & Co. hereafter will only secure from 125 to 150 tons daily, thus reducing the available steel supply for independent finishing mills from this plant by 75 to 80 percent.

In the spring of 1901 the Crucible Steel Co. of America organized the St. Clair Steel Co. and the St. Clair Furnace Co. in order to secure an independent supply of its raw material. Twelve 50-ton open-hearth furnaces have been built at Clairton, Pa., on the Monongahela River. The blast furnaces are 85x21 feet with a daily capacity of 500 tons each and there is a 40-inch blooming mill. A 28-inch three-high mill for rolling billets is now being installed, having one train of rolls. Plans for the erection of the Bessemer plant, a sheet bar mill and a beam mill have been in preparation but they will not now be carried out, owing to the large interest held by the steel corporation.

Despite this advantageous deal by which $6,000,000 in cash will be paid into the treasury of the Crucible Steel Co. of America, its common stock sold on the local exchange today at 13½ and sales of preferred were recorded at 78½.

INTERNATIONAL STEAM PUMP CO.

The report of the International Steam Pump Co. for the fiscal year ended March 31 has just been made public. The statement is favorable from nearly every viewpoint, showing a surplus of $506,154, an increase of $262,402. The profit and loss surplus aggregates $3,852,679, an increase of $238,262. The corporation marked off $258,918 for depreciation, which is $20,669 in excess of the sum marked off in the preceding year. The profits from manufacturing and trading aggregated $2,086,101, an increase of $345,899 as compared with the preceding year. The company paid $775,725 in preferred dividends and $490,638 in common dividends. The report follows:

	1903.	Increase.
Profits from manufacturing and trading	$2,086,101	$345,899
Other income	27,264	*27,686
Total income	$2,113,365	$318,213
Interest and discount	14,942	*31,875
Balance	$2,098,423	$350,088
Depreciation	258,518	20,669
Balance	$1,839,905	$329,419
Funded debt	67,388	67,388
Balance	$1,772,517	$262,031
Preferred dividends	775,725	*325
Balance for common	$996,792	$262,356
Common dividends	490,638	*46
Surplus	$506,154	$262,402
Previous surplus	3,346,525	*24,140
Profit and loss surplus	$3,852,679	$238,262

*Decrease.

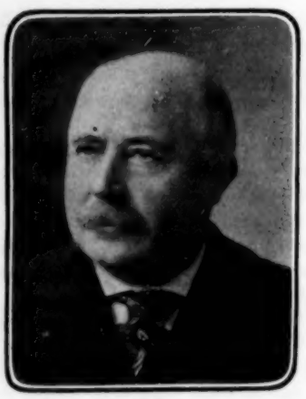
President John W. Dunn, in his report, says the plants of the company have been in operation without interruption during the year. The orders taken amount to $10,000,000, and the unfilled orders on hand at the end of the fiscal year show over $5,000,000. Notwithstanding the large increase in the output the demand for the product has been such that the company has been unable to reduce the amount of unfilled orders on hand to any appreciable extent. During the year additions in the way of new buildings in the various plants were made, among the most important of which were: A new foundry for the Laidlaw-Dunn-Gordon Co., at Cincinnati; a new foundry and machine shop for the Snow Steam Pump works at Buffalo and new warehouses for the George F. Blake Mfg. Co. at East Cambridge. As a result of these improvements the cost of production has been decreased and the output has been increased nearly 40 percent over that of the previous year. The new Henry R. Worthington plant at Harrison, when completed, will be the largest and best equipped shop of its kind in the world, and will enable the company to take care of the increasing demand for machinery. Arrangements have been made to extend the company's business in Europe by consolidating the European company with other companies and factories, which to a certain extent hold the foreign market. This consolidation has opened up a very important outlet for the company's production, and has practically solved the difficulties arising from tariff conditions.

In order to provide funds for improvements made and to meet the cost of extensive improvements completed and under way, arrangements were made around Jan. 1, to issue $2,500,000 of 6 percent debentures, which were subscribed for, and at the close of the fiscal year $1,892,677 had been received in respect thereof. The Henry R. Worthington Co., during the year acquired complete ownership of the Worthington Pumping Engine Co. The International Steam Pump Co. continues to hold the ordinary stock of the Blake & Knowles Steam Pump Co., Ltd., of England. The outstanding debentures of the English company have been further reduced during the year to $913,255. An annual drawing made since the close of the year will further reduce the amount outstanding by $74,205.

DEATH OF WILLIAM GARRETT.

William Garrett, the well known rolling mill engineer, died at Mt. Clemens, Mich., early Wednesday morning, July 15. While the announcement comes as a shock to his friends generally, those who were closest to him had warning several days ago of the fatal outcome. He had gone from his home in Cleveland to Mt. Clemens on July 2 to take the waters for an increasing indisposition, and on Saturday, July 11, suffered a stroke of paralysis, involving the entire right side. Only for a brief interval did he regain consciousness in the few days following. His two daughters by his first marriage were summoned from their Pittsburg home and were with him at the last. Mr. Garrett's wife and young son and daughter had gone to England in the latter part of June. They have been cabled and will start for home on Thursday. The remains were taken to Cleveland on Wednesday and the funeral will be held on Friday.

To a wide circle of engineers and iron and steel manufacturers the news of Mr. Garrett's death will bring a sharp sense of loss, for he was familiarly known throughout the country as few men in the iron trade have been. His individuality was marked and for one who had missed the advantages of the training of the schools his advance in engineering was conspicuous. He was a member of leading engineering societies in this country, and of the Iron and Steel Institute, of Great Britain. He had written much on rolling mill practice for technical journals, and had contributed several papers to engineering societies. In



the Garrett rod mill, with which his name is inseparably connected, he has an enduring monument. His invention was a decided revolution in prevailing methods, bringing nearly 100 percent increase in output with a marked decrease in labor.

Wm. Garrett was born in England 59 years ago. His rolling mill career began in the works of Scotland. He started in the mill at 11 years of age and at 16 was operating a guide mill. What the ordinary boy gained at school in daylight hours, Mr. Garrett acquired by the hardest effort after his day's work was done. Coming to the United States in 1878, he found work with the Cleveland Rolling Mill Co. and was connected with its mills for the following five years. It was in 1882 that he brought out the first type of the Garrett mill. This was the first rod mill in which a 4-inch billet was rolled into a No. 5 rod without reheating. Previous to this time it was the practice to use a 1⅝-inch or 2-inch billet. Mr. Garrett's process also involved the rolling of an ingot to a 4-inch billet without reheating, replacing the practice of reducing the ingot to a bloom, which was reheated before conversion into billets. The saving involved in these improvements was at that time about $7 a ton. As indicating the vitality of this invention, it is stated that substantially 80 percent of the rods rolled in the United States today are the product of Garrett mills.

Mr. Garrett went to Pittsburg in 1883 and in that year built the rod mill in the Oliver Wire Co.'s South Side plant. Returning to Cleveland in 1886 he built a rod mill for the American Wire Co. Afterward he was connected with the Joliet Steel Co. at Joliet, Ill., building there a rod mill which later became one of the Illinois Steel Co. properties and is now operated by the American Steel & Wire Co. It is a mill noted for record-making. The two finishing mills have made 10,000 tons each in a given month. Mr. Garrett removed to Cleveland in 1897 and established the Garrett-Cromwell Engineering Co. His partners in this enterprise are H. W. Lash and John C. Cromwell. The firm has grown rapidly and has had in charge some of the most important new construction undertaken by large steel companies in the past three years.

Lake Superior Iron Mines.

The fact that the shaft of the Maas mine has been securely bottomed in the ledge, a depth of 166 feet, has caused rejoicing to the people in Negaunee. The work of sinking was commenced in March, 1902, and has been vigorously prosecuted every day since that date. Many difficulties were encountered.

The Moore mine, Cascade range, promises to be one of the largest producers on the range. The United States Steel Corporation is stripping a large area of the surface, so that when mining operations are commenced there will be no interruptions on account of dirt being in the way. The Moore will be the only steam shovel proposition in Michigan.

Pumping and other machinery is being removed from the Columbia mine, Menominee range.

Four shovels are at work in the Crystal Falls district loading from stock piles as follows: At the Hope mine of the Oliver Mining Co., two at the Armenia mine of Corrigan, McKinney & Co., and one at the Tobin.

The few thousand tons of ore put in stock at the Monongahela mine of the Jones & Laughlin Steel Co. have been sold to the Thomas Furnace Co. and are being shipped all rail to the furnaces of that company at Milwaukee.

The Cleveland-Cliffs company is developing a body of silicious ore close to the west shore of Iron Mountain lake, within the limits of Ishpeming City. The ore rises to a height of about 100 feet above the lake level, and upon the face of a diorite hill. The ore is identical in appearance and chemical analysis with that of the Tilden mine.

Deering Interests Acquire Coal Property.

Deeds have been recorded in Sullivan County, in southwestern Indiana, covering 4,000 acres of mineral lands, the transfer being to J. K. Deering, of Chicago. The consideration is over $200,000. The deal is undoubtedly made on behalf of the Deering Division of the International Harvester Co., which will open up coal mines in the district named to supply fuel for its blast furnaces and steel works at South Chicago. The company already has ample Lake Superior ore properties in the Agnew and Hawkins mines on the Mesabi range and a newly developed mine in the Baraboo district of Wisconsin.

The Howe-Brown Mill Retained.

(Special Telegram.)

PITTSBURG, Pa., July 15.—Negotiations for the sale of the Howe-Brown mill property on Penn Ave. by the Crucible Steel Co. of America to the Pennsylvania Railroad are off entirely, as no satisfactory arrangement could be made with the railroad company. If the sale had been consummated it was the intention to remove the machinery to some of the other plants of the Crucible Steel Co. of America.

The 41st annual outing of the Lunkenheimer Co., Cincinnati, will be held Saturday, July 18, at Woodsdale Island Park. Seven hundred employes and their families participate this year or in all about 2,000 people, including children. Everything is free, including transportation, refreshments, music, dancing, etc., the entire expense of the outing being paid by the company. Woodsdale Island Park is about 31 miles from Cincinnati on the C. H. & D. railroad and it requires two sections of ten coaches each to carry the passengers.

The Labor Situation.

ADVANCE IN PUDDLERS' WAGES.

(Special Telegram.)

PITTSBURG, Pa., July 15.—As a result of the sixty-day wage scale adjustment the puddlers affiliated with the Amalgamated Association secure another advance for the next two months. This rate is fixed on a base of 1.7. The rate of the last sixty days, which was $6.12½, was also fixed on a 1.7 base, but under the new scale the wages of the puddlers advance 25 cents for every one-tenth instead of 12½ cents as formerly. Under the new conditions governing the scale the wages of the puddlers therefore went up to $6.25. The wages of the scrappers also advanced in proportion and there is a slight advance in muck rolling. All the finishing or bar mill scales remain the same, and will not be affected one way or the other.

THE PITTSBURG BOILER MAKERS' STRIKE.

(Special Telegram.)

PITTSBURG, Pa., July 15.—A conference is being held at Newell's hotel today between the boilermakers and manufacturers for the purpose of arranging some scheme of arbitration for the adjustment of their differences. The boilermakers have been on a strike since May 1 and are demanding an advance from $3.40 to $4 per day and a reduction in working hours from 9 to 8. This strike has effectually tied up all work on new blast furnace construction in this district. There is a possibility that today's conference may resuult in a settlement of the strike as both parties are tired of the struggle.

NEW YORK METAL TRADES TROUBLES.

NEW YORK, July 14.—The strike of the marine machinists is practically a failure, as little or no difficulty is experienced in filling the places of the strikers. Conferences are now being held between the local foundrymen's association and representatives of the Iron Molders' Union on the demand of the coremakers for a minimum of $2.75 per day, and an early and amicable settlement is expected. Many machinists are seeking employment hereabouts.

PITTSBURG MACHINISTS ACCEPT TERMS.

The Pittsburg Machinists' Union, at a mass meeting of 1,000 members, decided to settle the wage scale on the basis proposed by the manufacturers' association, which calls for a 7½ percent advance over last year's rate. This vote ended a memorable struggle between workmen and employers, which never came to open hostilities. The union at first demanded a 15 percent advance over former rates, double time for all holidays and the dismissal of all non-union men. The demand for complete unionizing of plants was finally withdrawn. The settlement will affect directly about 8,000 men. The associated manufacturers represented 55 of the largest employers of machinists within 20 miles of Pittsburg.

AGREEMENT OF ST. LOUIS FOUNDERS AND MOLDERS.

Foundry labor questions in St. Louis have been adjusted for another year, with the exception of the wage rate, which comes up again for consideration on Oct. 15, the foundrymen contending that business conditions at that time would show more plainly than on June 30, when the agreement was signed, that the advances asked were not justified. The new agreement is as follows, being signed on behalf of the St. Louis Founders' Association and the Iron Molders' Union No. 59 and the Core Makers' Union No. 426:

1. Beginning July 1, 1903, the minimum wage rate for molders and core makers in the city of St. Louis and vicinity shall be as follows: Journeymen floor molders, $3 per day of 9 hours; journeymen bench molders, $2.90 per day of 9 hours; journeymen core makers, $2.70 per day of 9 hours; with no reduction in present wages. This rate to remain in effect until Oct. 15, 1903, when a meeting of this conference is to be called to consider further the wage clause of this agreement.

2. Nine hours shall constitute a day's work, 54 hours per week. These hours shall be worked between 7 a. m. and 6 p. m. Nine and one-quarter hours (9¼) per day may be worked at single time rate, providing the weekly schedule is not more than 54 hours. All time above 9¼ hours per day or 54 hours per week shall be paid for as overtime.

3. Prices to be paid for piece work shall be fixed by mutual agreement between the employer and workman who performs the work. Such prices shall allow a journeyman molder to earn at least the minimum wage of the class to which he belongs. Any dispute in regard to piece work shall be adjusted by the employer or his representative and a committee of three molders in his employ, who shall have been working in the shop for a period of 2 years, or a sufficient length of time to be thoroughly familiar with the class of work in question and who shall be personally acceptable to the employer. In case of final disagreement the resulting dispute shall be treated in accordance with Article 6.

4. All overtime except in case of accidents or causes beyond control, shall be paid for at the rate of time and one-half time, with double time for Sundays and the following holidays: New Year's Day, Fourth of July, Labor Day, Thanksgiving Day and Christmas. Overtime exceeding 30 minutes in case of accident or causes beyond control shall be paid for at the single time rate. Provided, however, that in order to draw overtime a molder must be willing to do additional work at molding for a period corresponding to such overtime.

5. That this agreement shall remain in force except in regard to the rates of wages as provided for in Article 1, to May 20, 1904, and that a conference of the parties hereto shall be held on or about April 20, 1904, to arrange for modification or extension of same.

6. That during the life of this agreement no strikes shall be ordered or sanctioned by the union nor any lockout ordered or sanctioned by the association in the shops of any members of this association, for any reason whatever until the matter in dispute has been submitted to a committee of investigation or arbitration to be composed of three members to be appointed by the association and three members to be appointed by the union. The decision of a majority of said committee shall be rendered within five days from the date upon which the question in dispute shall have been submitted to it, and shall be considered final in so far as the future action of the respective organizations is concerned.

N. M. T. A. EMPLOYES' CERTIFICATES.

The National Metal Trades Association has perfected a plan for issuing certificates of recommendation to employes who have been faithful to the association and its members. To become eligible to receive such a certificate the applicant is required to show that he has worked 60 days during labor trouble for a member of the association. Then upon recommendation of the employer the certificate is issued, but not until the secretary of the association has made the necessary inquiries to verify the correctness of the claims presented on the application blank. While this is a new feature with the association the arrangement is retroactive and applies to men who have worked through any former strikes. The certificate is contained in a leather bound passbook of pocket size, and bears the signature of the president and secretary of the N. M. T. A. On accepting employment the holder of the certificate deposits it with his employer, receiving it again on the termination of such employment.

A NATIONAL EMPLOYERS' ORGANIZATION.

The executive committee of the National Association of Manufacturers had a two days' session in Indianapolis last week. The committee met by direction of the New Orleans convention of last March, which called for a new constitution that would include as members of the association employers other than manufacturers. Under the constitution, favored by the committee, the name of the organization will be the National Association of Manufacturers and Employers. Its purposes will be to maintain all the present purposes of the manufacturers' association, and in addition to offer all employers an organization with which they may affiliate. It plans a federation of the employers of the country to resist the aggression of organized labor through its federated organizations. An

emergency fund of $1,500,000 is provided for to be used for active resistance to the advances of organized labor and to sustain the organization. The fund is proposed to be raised largely by membership fees.

It is also a part of the scheme that State associations of employers be organized, to be subsidiary to the National organization, and the State organizations to have affiliated with them organizations in various cities. It is proposed to hold at Chicago a convention of employers from all parts of the country for the completion of the plan. Meantime the new constitution is to come before the executive committee at its September meeting. If then approved, it is said that President Parry will submit it to a vote by mail. Among those present at the Indianapolis meeting were President D. M. Parry, Indianapolis; J. W. Van Cleve, St. Louis; John Kirby, Jr., Dayton, O.; E. F. Du Brul, Cincinnati, O.; A. C. Rosencrans, Evansville, Ind.; Fred W. Job, Chicago; A. C. Marshall, Dayton, O.; Wm. H. Spear, Newark.

OPPOSED TO SYMPATHETIC STRIKES.

A strong recommendation against sympathetic strikes among marine workers on the lakes and seacoast was the main feature in the yearly reports of President D. J. Keefe, and Secretary H. C. Barter, read at the session of the twelfth annual convention of the International Longshoremen, Marine and Transport Workers' Association at Bay City, Mich., July 13. In his report, President Keefe said: "It has taken years of patient struggle and sacrifice to build up our organization, and the wisdom of the best minds who have suffered in the past contend that not unless the provocation is very great should we order a sympathetic strike. The past policy of this organization has always been to exhaust all means to arrive at a satisfactory settlement, and only when every other means fail to strike, and then to do so with a full knowledge and appreciation of what the contest means and prepared to meet all the conflict entails."

NEW YORK BUILDING CONDITIONS IMPROVED.

About 50,000 skilled mechanics in New York City have returned to work this week under the modified plan of arbitration of the Employers' Association, which dispenses with the walking delegates and establishes a joint board of arbitration.

LABOR NOTES.

The strike at the plant of the Ashland (Ky.) Steel Co. was settled amicably last week but neither side will state terms. It is understood that the men return to work as before, at union wages without recognition of the union. This settlement will result in the immediate resumption of the plant when repairs now in progress are completed, and the Norton nail mill at Ashland and the Kelly and Belfont mills at Ironton, O., will resume as soon as their scattered employes can be gathered together and stock secured.

The employes of the Harbison-Walker fire brick plants at Portsmouth, O., struck last Thursday in sympathy with the employes of the company now out in the Pittsburg district, but the company announces that it will secure new men and resume at once.

The founders and molders of Cincinnati have been in conference over a demand for a nine-hour day and an advance of 20 cents a day for bench molders. The employers' committee in conference has pointed out the disadvantage under which they would labor, as against competing localities, and some counter proposals are now being considered.

A settlement has been effected on the steel hoop scale between the Amalgamated Association and the Sharon Steel Hoop Co. at Sharon. The company has been given several concessions on account of the improved machinery. The rollers will receive a reduction of 17½ percent from the scale, the heaters will receive 12 percent reduction, while the roughers will get no reduction. The settlement of the scale in Sharon will affect a number of concerns throughout the country, which will settle on the same basis.

The Jenifer Furnace Co., Jenifer, Ala., employing from 152 to 200 men, signed a temporary scale with the United Mine Workers, granting all the demands of the men, which include 5 cents advance, eight hours per day and semi-monthly pay days. This is the first furnace company to take such action.

Owing to the extreme heat in the rolling mills of the Republic Iron & Steel Co., at Springfield, Ill., a few days ago, five men were prostrated. The puddlers then went on strike demanding better ventilation of the plant. The company tore down a number of buildings which interfered with the ventilation and the men resumed work.

The Amalgamated Association of Iron, Steel and Tin Workers has announced that the following companies have signed the scales for the ensuing year: Weller Rolling Mills Co., Anniston, Ala.; Westerman & Co., Lockport, N. Y.; Tennessee Coal, Iron & Railroad Co., Bessemer, Ala.; Ohio Rolling Mill Co., Findlay, O.; Emlyn Iron Works, East Chicago, Ind.; Eagle Horseshoe Co., South Milwaukee, Wis.; Muskingum Steel Co., Zanesville, O.; Carnahan Tin Plate Co., Canton, O.; Republic Iron Works, South Side, Pittsburg; A. M. Byers & Co., South Side, Pitsburg; Tyler Tube Co., Washington, Pa.; Zanesville Iron Co., Zanesville, O., and the Niles Iron & Sheet Co., of Niles, O.

An Italian strike breaker at the foundry of E. C. Stearns & Co., Syracuse, N. Y., July 12, fired upon and wounded a union molder employed elsewhere, but in sympathy with the strikers. The Italian and several others were arrested.

A lockout of foundries and machine shops throughout Sweden, affecting 15,000 men, has been declared as the result of a wage dispute.

The Columbus Iron & Steel Co., Columbus, O., whose plant was closed temporarily on account of labor trouble, resumed on July 9. The employes withdrew their demands.

The strike at the Inland Steel Co.'s plant of Indiana Harbor, Ind., has been settled and 800 men have returned to work. The men were granted a slight advance in wages.

The Eastern Shipbuilding Co. has reopened its yard at New London, Conn. Two weeks ago the men employed in the yard threatened to strike. The company caused a deadlock by closing the yard indefinitely. The men had intended demanding 10 hours' pay for nine hours' work. The move on the part of the company, besides taking the wind out of the strikers' sails, gave opportunity to overhaul the machinery and trollies, a thing the company has intended to do for some time.

CONTINUOUS OPERATION OF THE IRON FOUNDRY*

BY JOHN C. KNOEPPEL, OSWEGO, N. Y.

In writing on this subject the writer desires to be understood as not being antagonistic to the continuous operations of our foundries, recognizing, as he does, the general progress of the trade in this country, as well as the inventions brought out to develop and cope with the demands for castings to meet the requirements of our customers. The fact cannot be contradicted that the foundries in this country are entering into an era of improvements and facilities gigantic in their proportions.

All of this naturally suggests to the advanced founder that the most economical ways and means to secure the best results are to operate the foundry continuously. In giving my views on this important subject I write from the standpoint of a practical molder and foundryman of over thirty years' experience in all lines of castings, and will at the outset make mention of several features that we as foundry managers should give careful and thoughtful consideration.

1. Do the present conditions of the foundry business warrant the operation of the foundry on the continuous plan? 2d. Would this be to the interest of foundrymen in general and a paying investment? 3d. Would the expenditures necessary for the continuous operation of the foundry give adequate returns? 4th. Would the output be of a better quality? 5th. Would not the continuous working of the foundry tend to increase the wear and tear of machinery, tools and maintenance? 6th. Would the continuous operation of our foundries be beneficial to the workman and his family? 7th. Would it not become monotonous and tend to retard general progress rather than to increase it, and have a tendency to decrease the

*Read at the Milwaukee meeting (June, 1903) of the American Foundrymen's Association.

capacity and ability of the molder and mechanic? 8th. Would it not have the effect to decrease the qualifications and skill of the individual molder by this continuous work and constant humdrum of foundry life, and thereby lessen the ambition of the young man who enters the foundry as an apprentice with the view of becoming a molder and a mechanic? 9th. With the present supply of help, both molders and general laborers, can the foundry be operated on a continuous basis successfully when we consider the scarcity of all classes of labor, the rate of pay, and the demand and supply of work, all of which govern the successful operation of a foundry?

When we consider the present times and the progress the foundry has made during the past ten or fifteen years, it is no wonder that many are inclined to the idea of operating a foundry on a continuous plan as giving the best results and greatest returns. This subject is timely when we consider the enormous volume of business and the close competition in our products, together with the possibility of a shorter working day and the desire of the molder to curtail his output. Under these conditions would the continuous operation of the foundry be profitable? As managers of foundries we are asked to pay an honest day's wages, and in return we expect to obtain an honest equivalent of work per day. Do we obtain this, and can we get it at all times? Are we not handicapped in many localities and forced by circumstances to hire men who are not capable, and in this way increase the cost of our product and output?

Under some conditions we might be led to believe that continuous operation would be the best plan to follow. The first thing to ascertain is whether present conditions would warrant this. In a general way the writer believes they are not favorable. In the continuous operation of a foundry the wear and destruction of machinery and tools would be greater in proportion, for the time for repairs would be limited.

Again, would it be best, considering the expense and outlay of capital, to encourage this plan of operation? Are we prepared and physically able to handle the work if allotted to us, and can we stand the strain of responsibility included in the management of a foundry on the continuous plan? The writer finds that the foundryman of today in a progressive shop has his hands full to keep up his end and come out ahead at the end of the year.

Further, would the output of a foundry be of a better quality than it is under present methods of operation? Where large bodies of men are employed we find it a difficult matter to hold steady men, and the more we have to employ the worse will this evil become. Then, again, where the same work has to be continued and performed by different shifts of men, this does not always result satisfactorily and would consequently give more chance for mistakes and loss to the foundry.

It is also likely that continuous work in the foundry would be injurious to the health of the molder, as the fact remains that a molder working by natural daylight and under normal conditions can perform his work to better advantage and with less percentage of mistakes and loss than where a foundry is working under a continuous plan or with two or three shifts of men.

Continuous operation is not productive of the best results for the reason that the work is not performed as uniformly well as at present, where the men are in good condition and labor with greater zeal and ambition. Continuous work is irksome and tiresome to the individual who needs his normal rest to prepare him for the next day's labor, and the proper time to obtain this is during the night.

There would also be a tendency for other disturbing elements to arise, and mistakes would be liable to happen more frequently where two or three shifts of men are employed. The constant hustle and bustle in foundry work during the molding and casting, where this takes place at the same time, would naturally draw the attention of the men from their work and be the means of producing mistakes and accidents. An increasing number of patterns and flasks would also be required, as well as a larger force of molders and helpers.

While the melting might be done continuously to accommodate the changed conditions, there will be a tendency to increase the cost of repairs, and the installation of additional cupola capacity would mean further expense and the employment of more help. There will be bound to be more or less confusion where a large quantity of metal is being melted and handled, and the foreman would require assistance to keep things moving in the right direction. In view of this increased cost of production, will it pay to arrange and fit up our foundry to run continuously? In case of break-downs, shortage of work or delay of any kind, there will be losses which would materially increase the cost of the output.

There is no question that there will be an increase of foundries operated on the continuous plan, but it is doubtful if the majority of us are prepared to take up this question at this time. The shortage of molders and coremakers has put the majority of the managers and foremen of foundries in a serious predicament, and continuous operation would in no wise remedy existing troubles. To overcome the shortage of capable men we are putting in molding machines and the very best improvements that can be secured, yet it is to be remembered that before molding machines can be worked, men must be found to handle them. I believe we have a sufficient number of foundries in this country to handle all the business that has to be done, under our present methods and conditions. Where foundries are being operated continuously and successfully it will generally be found that the product is under their own control and is being duplicated by the thousand. The demand which has existed for castings for the past four or five years is not likely to be with us always. What we need more than anything else is the proper management of our works, so that a larger output can be secured per man. This can best be accomplished by constantly keeping the molder employed during the day and providing him with the proper tools and supplies in time.

It has been my experience that mistakes are largely due to work being performed on the same job by a number of men, or by different shifts of men. I have yet to see a molder who does not prefer to do his own pouring, and to my mind a very large number of castings, no matter how well the molds are made, can be and are lost through improper pouring; and so it is where more than one party is engaged on one job, the blame and responsibility are always shifted to the other fellow, and hence the responsibility of the individual molder is lessened. No doubt continuous operation will be in line with progress and shorter hours and the reconstruction of foundry methods, but on all of this further education must be had for both employer and employe.

I am of the opinion that a much larger field is in store for the molding machine in the future, partly on account of the scarcity of molders, which forces the manufacturer to avail himself of every practical invention brought out to reduce the cost of his castings. I have always found it a good investment to have the men out of the shop in time, as they are then in a better mood and condition to resume their labors next day. In shops making a practice of being late the men do not take kindly to this, and we cannot blame them. Where the molders know they will get home in good season, they will be more ambitious to accomplish their work on time, and I prefer to allow them to go home when they are through casting. In my judgment it is poor management to keep the men sitting around in wet clothing waiting for quitting time, and I find I can get more work out of them by treating them like men and being reasonable in all things. It is not always possible to leave the shop on time, and where such is the case I find they are willing to help out when they know the circumstances. In my opinion the manager of a foundry does not have to exact the last minute's service from an employe in order to make money for his employer.

The O. B. Wilson Co., manufacturer of specialties from sheet iron, has moved its plant from Indianapolis to Gosport, Ind.

TESTING OF BEARING METALS.*

BY G. H. CLAMER.

To the operating department of railroads, to the constructors and operators of all manner of machinery with revolving parts, the question of bearings is of the highest importance. There is no other material of construction about which so much uncertainty exists, and no other material so worthy of consideration.

In the first place, it is generally conceded and no doubt is true, that the composition and structure of a bearing has much to do with causing or preventing so-called "hot boxes." I say "causing" because segregations, hard spots, or whatever one may choose to call them, frequently are the source of irritation of the journal and its consequent results. I say "preventing," because a composition which is so constituted as to be of a yielding or plastic nature will often prevent the abrasion of the journal by conforming to its irregularities, etc. Furthermore, the item of wear is a very material consideration in the operation of rolling stock and general machinery equipment, and a thorough study of the wearing properties of the various combinations of metals cannot fail to lead to a wonderful saving in bearing metal consumption.

The chief points to be considered in the study of such alloys are as follows:

1. Wear of bearing.
2. Wear of journal.
3. Friction.
4. Temperature of running.
5. Compressive strength.
6. Structure.

The first four of these tests can be made on a testing machine, which is designed for the purpose. A great many machines have been designed, but most of them have been very unsatisfactory. The results obtained in this way are merely comparative, however, and cannot be compared to the actual service test, which is made under actual conditions. The best the testing machine can do is to give us a general knowledge of the qualifications of the alloy. The wear tests are particularly important, and by comparison with a certain standard give the ratio of resistance to abrasion.

Time will not permit me to go into the details of the construction of machines, nor the method which I have adopted for carrying on tests of this kind, and I can only give some of the general conclusions arrived at, in connection with the alloys which we have thus far examined: 1 Wear decreases with the decrease of tin in copper-tin alloy. 2. Wear decreases with decrease of tin in copper-tin-lead alloy. 3. Wear decreases with increase of lead in copper-lead alloy or copper-tin-lead alloy. 4. Wear increases with increase of zinc in copper-tin lead-zinc alloy. 5. Wear increases with increase of antimony in lead-antimony alloy.

Wear on journals in general increases with decreased compressive strength, or in other words the hard metals when running under normal conditions cause less abrasion of the journal than soft metals. This, of course, does not refer to abnormal wear caused by actual gripment of the bearing surface.

Theoretically, the friction is a feature depending only on the kind of lubricant, and entirely independent of the kind of metal composing the bearing or the journal. Were it possible to have theoretically perfect surfaces, perfectly adjusted, the friction would be entirely fluid friction, or friction of fluid against solid. Actually, however, the bearing surfaces are of considerable consequence, even when running under normal conditions, and in general, it may be noted, that the softer the metals in contact, the higher the coefficient of friction, and vice versa, but when the quality of the bearing is called into service to overcome aggravated conditions; for instance, when lubrication is interfered with, or foreign matter becomes interposed between the bearing surfaces, causing abnormal pressure, under such conditions it is necessary that the alloy have a certain yielding nature, in order to re-establish a large area for the distribution of pressure. It is for this reason that the softer metals will always give less trouble than harder metals, although the friction under normal conditions is higher with softer compositions.

A test of the compressive strength gives a general knowledge of the pressures under which the metal will operate successfully; whether the alloy is brittle; and if it is sufficiently plastic to withstand a reasonable amount of ill use without becoming heated.

An examination of the general structure of the alloy is quite important, as it shows defects, such as segregations, etc., which could reasonably be supposed to cause friction. It is with this in view that the specifications of the large railroad companies call for an examination of the fracture of at least one brass in each hundred.

Microscopically it has been shown by Charpy that a successful bearing alloy should consist of at least two structural constituents, one hard constituent to support the load, and one soft constituent to give it the plastic support. An investigation of this kind, therefore, tells us if the alloy possesses such an arrangement of its particles.

The importance attached to a careful study of bearing alloys will be apparent from the following figures: There is in the service of railroads in the United States on 1,600,000 cars approximately 160,000,000 pounds, and on 39,900 locomotives approximately 5,000,000 pounds, which at an average value of 13c per pound represents a money value of $21,450,000, and I should judge that the amount in service other than for rolling stock—for instance, on stationary engines, rolling mills and machinery equipment of all kinds—would easily double this amount.

It will be seen that a large part of the copper, tin, lead, antimony and zinc consumption is for the manufacture of bearings.

An examination of the bearing metal specifications of the various large railroad systems, will show a wide difference of opinion on the subject, and in view of the uncertainty existing, the large consumption, and the importance attached to the question, I recommend this as a suitable subject to be considered by this society.

*Read at the Delaware Water Gap meeting (July, 1903) of the American Society for Testing Materials. Mr. Clamer is connected with the Ajax Metal Co., of Philadelphia.

Personal.

Henry Doyle, formerly of Columbia, Pa., is now superintendent of the tube mills of the Youngstown Iron, Sheet & Tube Co., Youngstown, O.

Henry Thomas, superintendent of the Portsmouth Steel Co., Portsmouth, O., will leave Aug. 1, to take the management of the American Sheet Steel Co.'s plant at Canton, O. His successor at Portsmouth is not yet announced.

Alva C. Dinkey, superintendent of the Homestead Works of the Carnegie Steel Co., will probably succeed W. E. Corey as president of the company.

Geo. H. Gibson has resigned as manager of the advertising and publication department of the B. F. Sturtevant Co., of Boston, to accept an appointment with the International Steam Pump Co., having offices at 114-118 Liberty St., New York City. Mr. Gibson was formerly connected with the Westinghouse Co.'s publishing department, of Pittsburg, and was for two years a member of the editoral staff of the *Engineering News*, of New York City.

Major Charles D. Rhodes, who for several years has been assistant general sales agent of the Illinois Steel Co., Chicago, resigned his position this week to become general sales agent for the Lackawanna Steel Co. Major Rhodes is one of the best known representatives of the steel industry in the West. He has had an extensive experience in all branches of steel mill products. He will at once open an office at 100 Broadway, New York, and before the mills of the Lackawanna Steel Co. begin to turn out product about Oct. 1, will have agencies established at various important distributing cities in the country.

George T. McKay, at one time connected with the Lake Shore Railroad's traffic department in an important capacity has been appointed traffic manager of the Lackawanna Steel Co. His headquarters for the present will be in New York.

CINCINNATI, July 15. (Special Telegram.)—Wm. Lodge of the Lodge & Shipley Machine Tool Co., Cincinnati, was thrown from a runabout this morning and severely injured. From the best information obtainable his condition is regarded as serious.

STANDARDS FOR TESTING CAST IRON.

Reference was made in our report last week of the Delaware Water Gap meeting of the American Society for Testing Materials to the work of the committee on Standard Specifications for Cast Iron and Finished Castings. This committee with Walter Wood, of R. D. Wood & Co., Philadelphia, as its chairman, had a meeting on April 25 at Philadelphia, as already reported, and divided its work among nine subcommittees. The original nucleus of the committee consisted of three persons—H. M. Howe, Walter Wood and Richard Moldenke, who were appointed by the International Association for Testing Materials at its Budapest meeting in September, 1901, as American members of its committee for the establishment of standard international methods of testing and specifications for cast iron and finished castings. Before the Philadelphia meeting the committee increased its numbers by 68 persons connected with the foundry and pig iron trades. The chairmen of the nine subcommittees are as follows: Pig Iron—Edgar S. Cook, Warwick Iron & Steel Co., Pottstown, Pa. Pipe—Walter Wood, R. D. Wood & Co., Philadelphia. Cylinders—H. V. Wille, Baldwin Locomotive Works, Philadelphia. Car Wheels—Dr. Chas. B. Dudley, Pennsylvania Railroad, Altoona, Pa. Malleable Cast Iron—Stanley G. Flagg, Jr., Philadelphia. General Castings—Thos. D. West, Sharpsville, Pa. Testing Cast Iron—Henry Souther, Hartford, Conn. Influence of Special Metals on Cast Iron—A. L. Colby, South Bethlehem, Pa. Structure of Cast Iron—Prof. A. Sauveur, Cambridge, Mass.

Standards for Testing General Castings.

Progress reports from these nine subcommittees were presented by Mr. Wood at the Water Gap meeting, and it is the expectation that further progress will be made so that the American members of the international committee will be able to send their definite recommendations to their European associates in time for the St. Petersburg meeting in August, 1904. Of the amount of work involved something may be inferred from the following suggestive report of Thos. D. West, chairman of the subcommittee on general castings:

As chairman of the section for the testing of general castings, I should say that there are several points which require careful consideration before any action is taken to establish a standard. First. What is the character of work that should be considered as general castings? Second. What special character of specifications should govern each separate class of general castings? Third, Whether the test bar cannot be made the fundamental guide for obtaining the desired physical qualities of many classes of general castings.

In commenting upon the first, I would suggest the following gray and chilled iron specialties, classified in the order shown. 1. Stoves and household heating furnaces. 2. Hollow ware and bath tubs. 3. Radiators. 4. Small pipe fittings and valves. 5. Pulleys and flywheels. 6. Dynamos and electrical work. 7. Hydraulic cylinders. 8. Pneumatic cylinders. 9. Freezing machinery. 10. Gas engines. 11. Steam cylinders and pumps. 12. Ingot molds. 13. Annealing pots and pans and gas retorts. 14. Acid proof castings. 15. Cast and cut gearing. 16. Punch, shear, stamping and crushing presses. 17. Lathes, planers, shapers and drill presses. 18. Printing presses. 19. Wood working machinery. 20. Weaving machinery. 21. Sewing machines. 22. Agricultural machinery. 23. Fan and blowers 24. Foundry molding machines. 25. Journal boxes and hangers. 26. Sidewalk grating and manholes. 27. Furnace and floor plate castings. 28. Grate bars and fire backs. 29. Column and architectural castings. 30. Air brake and railroad castings. 31. Brake shoes—chilled and gray. 32. Squeezer plates and rolls, chilled and gray. 33. Rolls, chilled and sand. 34. Miscellaneous rough and machined castings.

In the above specialties are lines of gray and chilled iron castings which have taken many years' labor and experience to perfect to meet the demands of modern service. The qualities exacted are best known to the makers and users. I do not wish it thought that I believe all the specialties shown are possible of being standardized; however, it is felt that dealers and users would gladly welcome any standard tests that would enable them to judge fairly of the durability of the new casting which they were purchasing. With this view of the subject it would seem that efforts should be put forth to formulate standards for testing all the lines of castings mentioned, as far as this is practical.

In discussing the second proposition we are called upon to suggest special methods to govern tests for the various specialties cited. In standards for testing stoves, etc., or Nos. 1, 2, and 3, it would be well where they are of a nature that would test the ability of independent duplicate parts to withstand radical changes in temperature or expansion and contraction under impact tests, in connection with the use of a proper size and form of test bars, to give the contraction and strength of the iron comprising the heat of castings being tested.

No. 4 would be well tested by having some stated standard of form and size to undergo tests of actual practice.

No. 5 could probably not be better standardized than by tests showing the contraction and strength of the iron in connection with chemical analysis.

No. 6 involves physical qualities which could be well displayed for the work intended by hardness tests and chemical analysis.

Nos. 7, 8, 9 are best tested by hydraulic pressure and are a class of work where standardizing would call for very varied practices. The test bar and chemical analysis might assist for many cases, but the hydraulic test which would disclose the evils of shrinkage should stand paramount to all others.

Nos. 10 and 11 could be standardized by testing the contraction, strength and hardness of the iron comprising their structure.

Nos. 12, 13 and 14 are best standardized by chemical analysis.

Nos. 15 to 34 will be best judged of by means of standard test bars and chemical analysis.

The third proposition advances the use of test bars in assisting to standardize general castings. I believe at the meeting of April 25 this was not the intent of those present. I fail to perceive how many general castings can be standardized without their use, and for this reason I advocate their adoption as shown. It must be evident, that to formulate standards for testing many of the specialties shown, involves great amount of labor and much expense, in some cases, as an example, as much as did the standardizing of tests for car wheels. For this reason an early formulation of standards cannot be expected.

Obituary.

Albert Manchester, superintendent of the Portsmouth Foundry & Machine Works, Portsmouth, O., died suddenly in New York, July 7, aged 45.

Thomas Chalmers, one of Chicago's early settlers and one of the pioneer machinery manufacturers of that section, died July 13, at his home in Chicago. Mr. Chalmers was the father of W. J. Chalmers, president of Fraser & Chalmers, one of the constituent companies of the Allis-Chalmers Co., and was himself one of the original founders of the firm of Fraser & Chalmers. He was in his 88th year.

George Crawford, one of the pioneer iron masters of the Hanging Rock, O., region, died last week at Scioto Furnace, aged 64 years. He had been identified with the old charcoal furnaces of that section since early in the forties and was owner of Junior Furnace from 1851 to 1873, when it went out of blast.

A West Virginia Coal and Coke Deal.

The Pittsburg & Fairmont Fuel Co., an Eastern corporation, nas purchased 15,477 acres of coal land in Wetzel county, W. Va., the Perry Coal & Coke Co. holdings at Adamston the Poose Coal & Coke Co. property near Lumberport and the Howard Coal & Coke Co. mines at Wilsonburg, the last three comprising 2,800 acres, and will increase the developments. The consideration is said to have been $1,500,000. The president of the Pittsburg & Fairmont Fuel Co. is Archer Brown, of Rogers, Brown & Co.

The rod mill of the Alabama Steel & Wire Co. will resume operations next fall. It is being thoroughly overhauled.

DEATH OF HENRY HANSEN.

A telegram received just before *The Iron Trade Review* for last week went to press announced the sudden death at Mt. Clemens, Mich., of Henry Hansen, associate editor of *The Foundry*. Mr. Hansen had left his desk in Cleveland only a week previous, in the hope that a brief stay at Mt. Clemens would arrest the progress of an ailment from which he had suffered for several months. Neither he nor his associates thought his condition dangerous and the fatal seizure came most unexpectedly.

The career thus cut short was unique in many respects. Born in Denmark in 1865 and coming to this country when in his 'teens, Henry Hansen had the energy, the good physique and the pluck that have converted others of his countrymen into American citizens of uncommon worth. To see the country was an early ambition of the boy immigrant and he traveled widely in those first years in the United States, going eventually to the Pacific Coast. He had early selected the molder's trade and followed it steadily, with the exception of a cruise on a whaler on which he shipped from a Pacific port. The night school gave the young molder some knowledge of the English language, and spurred by rare determination and

HENRY HANSEN.

helped by a will that never bent before difficulties, he persisted where the average man yields to the force of odds and to natural inertia.

The Foundry was started at Detroit in the fall of 1892 and Henry Hansen was among its early contributors. There was little written about everyday foundry practice then, apart from the works published by West, Bolland and Kirk; and Henry Hansen's manuscript showed that he not only observed, but that he saw correctly and had a sense of the news value of things pertaining to the foundry. He had also a well developed satirical faculty and a vein of humor. These were frequenty brought into play against the hasty conclusions and the mistaken practice of many who essayed to make public the results of undigested experiment. A few years later Mr. Hansen became associate editor of *The Foundry*, and his "Krank's Korner" and "Pokey's Pointers" are well remembered by the readers of that journal in his incumbency. An interval of service in the foundry followed, Mr. Hansen having accepted a foremanship at Plymouth, Mich. In 1899 he returned to *The Foundry* as its associate editor. In the past four years that journal had been almost exclusively under his editorial direction—a period in which its growth in size and in prestige has been noteworthy.

Mr. Hansen was painstaking in investigation, an indefatigable student, and in editorial work insistent upon accuracy. He was a natural skeptic and disposed to challenge innovations. He considered that the foundry had long been the haunt of a good deal of half-way practice and was unsparing in criticism of the nostrums and "discoveries" that are announced with much flourish from time to time.

Of his generous impulses, his enthusiasm in his work, his readiness to be of assistance to any who applied for his help on problems of the foundry, and his interest in those who bear the burden and heat of the day on the molding floor, all who knew him will have warm recollections. His associates on *The Foundry* and on *The Iron Trade Review*, appreciative of his good qualities, which have ripened under the intimacy of office companionship in the past two years, regard his untimely death as a personal loss. The foundry world will miss him as its faithful mentor and apt commentator.

While there was not as great activity in June as in the previous month, due somewhat to the unsettled labor conditions in various sections, the Becker-Brainard Milling Machine Co., Hyde Park, Mass., considers that business is in a healthy condition, and provided manufacturers can be on a settled basis, looks for another good year. Inquiries are satisfactory and the outlook for the next six months seems encouraging.

Commenting on trade conditions the Cleveland Crane & Car Co., Wickliffe, O., says that there seems to be more or less uncertainty on the part of those who have a large amount of work under way and contemplate larger plans for the future. The average manufacturer does not close for any work until it is absolutely necessary to do so. In the purchase of material this company finds that prices are still high where quick delivery is wanted, but lower prices than those of a few months ago are quoted on time contracts.

The directors of the Dominion Iron & Steel Co. have taken up the new issue of $1,500,000 second mortgage bonds, paying par.

The Cleveland-Cliffs Iron Co., Cleveland, has purchased another tract of 225 acres at Toledo, O., and now has a frontage of 4,000 feet on the Maumee River. This purchase has caused the revival of the story that the company intends to build a steel plant at Toledo, but it has no plan for so doing. If a steel plant is built, it will not be for several years.

The troubles of the United States Shipbuilding Co. are not yet ended. Receiver Smith last week signed an order terminating the leases of the subsidiary companies on the properties operated by them. The United States Shipbuilding Co. owns all of the shipyards, and leases them to the subsidiary companies for a rental equal to the net profits. These leases are all terminable at the option of the shipbuilding company on five days' notice. This option Receiver Smith has exercised. This order of the receiver is a step in the proceedings which counsel for the reorganization committee intend to resist to the end. The order does not apply to the Bethlehem Steel Co.

The works of the American Ideal Cash Register Co. in Bound Brook, N. J., were closed indefinitely July 11. No information relating to the company's intentions was given out.

The Gibson Iron Works, Gibson City, Ill., report satisfactory inquiries for radiation. The company has provided a good stock and looks for a large fall trade in the Exeter radiator, which is made in five sizes, in both steam and hot water.

The Sheffield Coal & Iron Co., Sheffield, Ala., started up stack No. 3 this week. The company has three stacks and two of them are in blast. Rogers, Brown & Co. are sales agents.

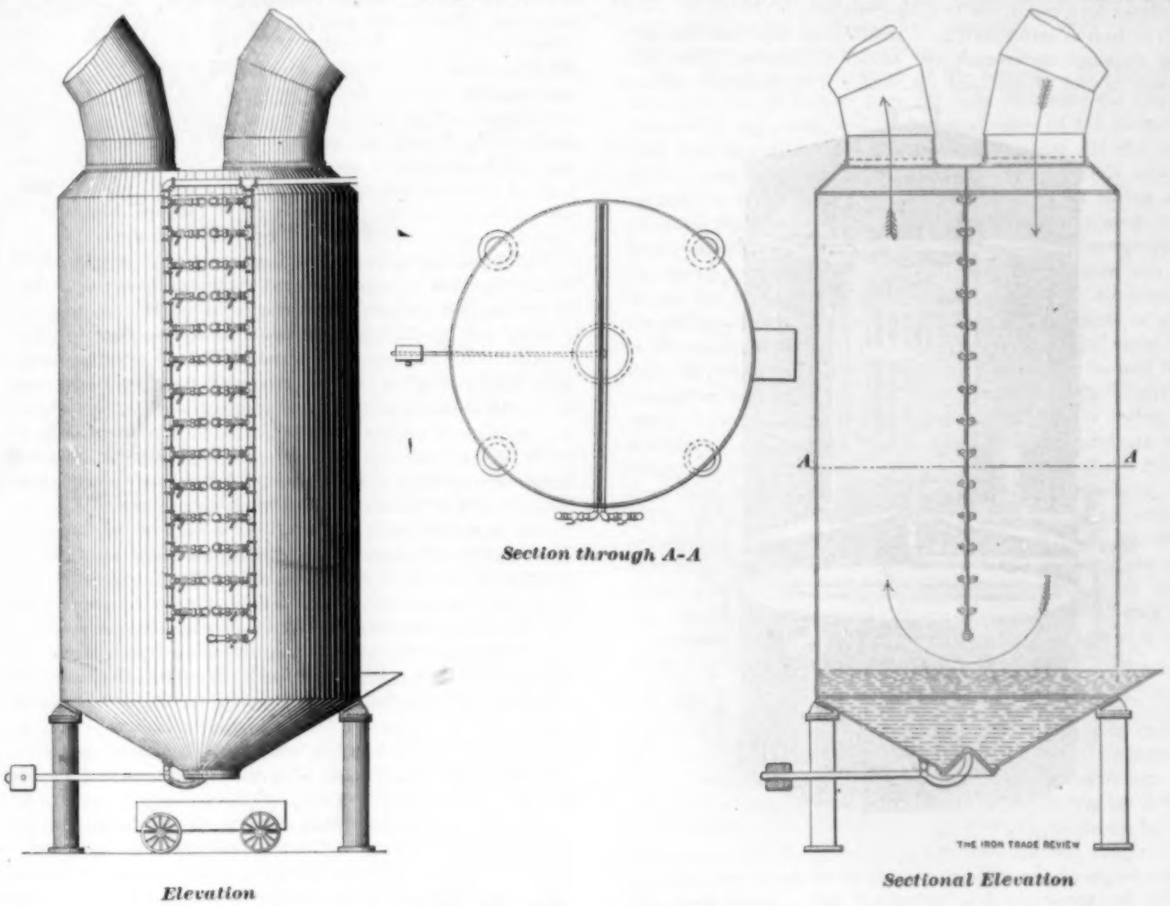
THE KLOMAN GAS WASHER.

There has been considerable discussion on the subject of blast furnace gas washers within the past few years, coming from the demand by blast furnace owners and superintendents for some practical means of eliminating the impurities from furnaces gases. The various devices designed and built for gas washing may properly be divided into two classes, one known as the spray gas washer and the other being a gas washer in which the gas impinges upon the surface of a body of water contained in a tank. Both types have been found more or less objectionable. The spray type in the form ordinarily used is objected to for the reason that while it does in a manner and to a certain degree wash the gas, or partly eliminate the dust from the gas, it also imparts to the gas a certain amount of water vapor which is as objectionable and undesirable as the dust or impurities. The other type of gas washer, in which the gas merely impinges upon the surface of a body of water, is objected to for the reason that it does not thoroughly wash the gas and in order to get good results it is necessary to build the washer of very considerable dimensions, which takes up a large amount of valuable floor space, making it on the whole a very expensive structure for the benefit derived from it. There is also some water vapor generated in this form of gas washer, which vapor is carried over with the gas.

The accompanying illustrations show the Kloman gas washer in which the designer sought to embody all the good qualities of the above mentioned types of gas washers without their objectionable features. The construction and operation of the Kloman gas washer is simple; the cost of construction and maintenance is low, while its efficiency is great. It is a round tank, in a vertical position and supported on short columns. The tank is divided into two compartments by a partition extending from the top to within a short distance of the bottom. On each side of this diaphragm are placed a number of straight spray pipes, the water from which falls into the hopper-shaped bottom, covering the entire bottom to a depth of a foot or more. It is thence discharged through the waste trough at one side of the washer tank, this trough being constructed to form a gas seal so that no gas can escape with the water.

The operation is as follows: The gas is taken into the gas washer through the inlet pipe, as indicated at the top by the arrow; thence it passes downward through the series of sprays on the one side of the diaphragm to the bottom where the gas impinges upon the body of water contained in the bottom of the tank; thence underneath the diaphragm and upward through the series of water sprays on the opposite side of the diaphragm and out through the top opening as shown by the arrows. The result of this operation is that the impurities contained in the gas, and which consist chiefly of particles of iron ore, coke and limestone, become saturated and fall into the hopper-shaped bottom of the washer tank.

Any water vapor that may be generated by the initial heat of the gas coming into contact with the water sprays in its first or downward passage through the washer, is condensed in its subsequent upward passage through the second set of water sprays. This vapor falls back into the bottom of the washer tank in the form of drops of water. All of the gas is thus thoroughly washed free from the objectionable impurities and free from water vapor as well. Some of the initial heat which the gas carried from the furnace is lost, but this is compensated for many times in having a clean gas to put into the hot blast stoves and under the steam boilers of the plant.



Elevation *Section through A-A* *Sectional Elevation*

THE KLOMAN BLAST FURNACE GAS WASHER.

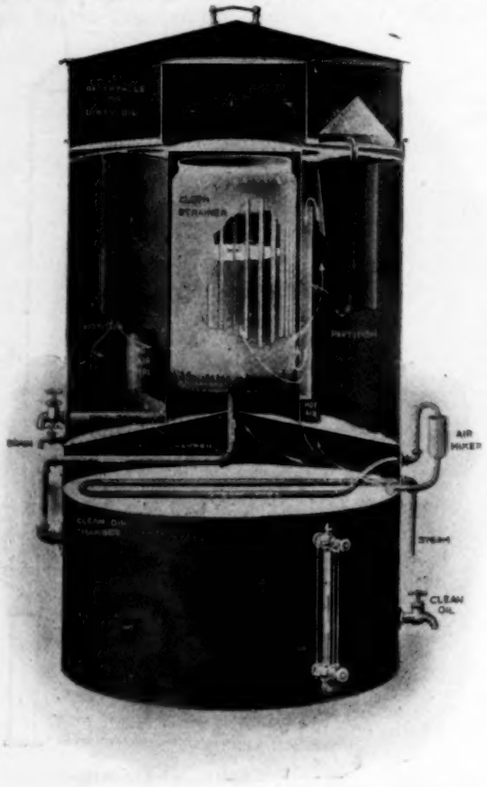
The impurities deposited from the gas in the hopper of the washer tank, and which consist largely of iron ore, can be dumped into a car or any other vehicle convenient and be put into the form of briquettes, to be recharged into the furnace, or, as is often done, they can be recharged in the moist condition as they came from the washer.

The first gas washer constructed on this plan was built and operated by A. C. Kloman at the plant of the Saxton Furnace Co. in connection with its No. 2 furnace on May 5, 1902, and it has been in continuous operation from that date, giving very satisfactory results. There has been no occasion to clean the hot blast stoves or the combustion chambers under the boilers in that time, for the reason that the gas delivered from the gas washer to the stoves and boilers is entirely free from the flue dust so common with ordinary blast furnace gas. This gas washer is now being built by the Kloman Co., engineer and contractor, whose office is in the Keystone Building, 4th Ave., Pittsburg.

THE BONAR OIL FILTER.

James Bonar & Co., Inc., of Pittsburg, are the designers of the oil filter illustrated below, which embodies a number of interesting features. The impure oil is emptied into the receptacle on the upper part of the filter, passing thence through the conical sieve. The construction of this sieve prevents any matter from collecting on it, and it may be readily cleaned off without clogging it up. After passing through the sieve the oil is conveyed to a low point in the chamber on other side of the partition shown on the right of the cut. Passing around the outer half of the chamber it meets the other partition, passing through it by means of a skimming device; thence to the other partition, where it again passes through a skimming device to the inner chamber. The inner chamber is a patented cloth filtration and separating chamber, composed of a galvanized iron cylinder on which is arranged a series of ribs, covered with special filtration cloth. The oil passes through the cloth from the outside, up between the ribs to the opening in the center and thence by pipe to the clean oil chamber underneath the heating chamber.

The heat is introduced by a small steam pipe into the heating chamber underneath the filtration chamber. This pipe passes in and around and out, where it is connected with an



A NEW OIL FILTER.

air mixer passing again into the heating chamber mixed with air. This method of introducing the steam prevents the temperature from rising above the boiling point and keeps the oil at a uniform temperature at all times. In the upper part of this heating chamber is arranged a series of heat conducting pipes passing up through the filtration compartments, imparting a uniform temperature to the oil in course of filtration. The cleaning of the filter and renewing of the cloth are accomplished by lifting out the inner cylinder, taking off the old cloth and tying on a new one. Drain spigots are arranged on the inner and outer filtration compartments.

C. W. Thomas, formerly president of the Roe Stephens Mfg. Co., Detroit, has purchased the Michigan Brass & Iron Works, paying about $331,000 for the property, which is located at Springwells, a suburb of Detroit, on a site of six acres, on which are located iron and brass foundries, machine shops and brass finishing shops. Mr. Thomas has retired from the Roe Stephens Co.

TENNESSEE COAL, IRON & RAILROAD CO.

In its application to list $3,000,000 general mortgage 5 percent bonds, which has been approved by the governing committee of the New York Stock Exchange, the Tennessee Coal, Iron & Railroad Co. makes the following statement:

Month of May, 1903—Net, $440,668; other income, $1,576; total income, $442,244; charges, $67,044; balance, $375,200; depreciation, $41,706; balance, $333,494; preferred dividend, $1,655; surplus, $331,839. Five months ending May 31, 1903—net, $1,746,238; other income, $9,544; total income, $1,755,782; charges, $333,298; balance, $1,422,484; depreciation, $195,180; balance, $1,227,304; preferred dividend, $8,277; surplus, $1,219,027.

The general balance sheet as of May 31, 1903, shows: Assets—Land account, $26,210,586; plant account Dec. 31, 1902, $7,094,023; construction and improvements, 1903. $945,510; deferred charges to operations (stripping at Greely-Brown ore mines), $5,414; trustees of sinking funds, $120,524; investments (proprietary land companies), $275,800; treasury securities (bonds and preferred stock of Alabama Steel & Shipbuilding Co.), $607,000; cash, $177,581; bills receivable, $86,613; accounts receivable, $1,958,025; inventory of products and supplies on hand, $1,878,032; total, $39,363,111. Liabilities—Common stock, $22,552,800; preferred stock, $248,300; funded debt, $11,908,500; guaranteed securities, $1,540,000; depreciation and reserve fund, $470,153; bills payable, $290,000; audited vouchers, pay rolls and current accounts payable, $829,480; accrued interest and unpresented coupons, $295,203; income account (surplus), $1,228,675; total, $39,363,111.

The $3,000,000 general mortgage 5 percent bonds of the Tennessee Coal & Iron Co. listed on the exchange are a part of $15,000,000 authorized, bearing date of July 1, 1901, becoming due July 1, 1951. Of the $15,000,000 authorized, $10,654,000 is for the purpose of redeeming the existing funded debt, outstanding on Dec. 31, 1900, and $4,346,000 is to reimburse the company's treasury for moneys paid out of earnings for permanent additions to its property, and to provide for other permanent improvements that may become necessary from time to time, in connection with the development of the company's steel business and otherwise.

The $3,000,000 of bonds which have been listed have been sold, and the proceeds have been expended, and are to be expended, as follows:

Already expended—As per annual report of 1901, $759,000 on steel works $690,000, on Ensley furnaces $31,000, on Pratt mines, $38,000); for twelve months ending Dec. 31, 1902, $1,469,046 (ore mines, $707,243, steel works, $363,018, Ensley and Bessemer furnaces $194,698, coal mines, rolling mill, etc., $204,087). To be expended (being in part contracted for), $1,624,096 (ore mines $221,424, steel works $348,854, Ensley furnaces $702,687, Pratt mines $264,102, other mines and furnaces $87,029. Grand total $3,852,142. This leaves a balance of $1,345,000 of the amount authorized to be expended for permanent improvements, etc., which amount it is requested be listed from time to time in such amounts as may be sold or otherwise disposed of, on proper application from the company, showing that the same have been sold, and that the proceeds have been used for the purposes for which they were authorized.

Referring to recent developments in the machine tool trade from the standpoint of their own experience the Beaman & Smith Co., of Providence, R. I., write us in response to an inquiry: "We are receiving a great many inquiries and submitting propositions; and while this not unusual yet we are not receiving a definite response except in a very few cases, the disposition apparently being to await some development prior to the order being placed. Just what is expected seems to be quite vague and there is apparently nothing on which to base expectations."

The July meeting of the New England Foundrymen's Association was in the form of an outing, the Point Shirley Club, Winthrop, Mass., being the objective point. The trip was made on the afternoon of July 8. There was no program, the members taking dinner together informally.

Steel Springs.*

BY WILLIAM METCALF.

In compliance with a request for a paper on the subject of springs, it may be well to begin with a short history of the conditions and changes that have occurred in the past 30 years in car and locomotive springs.

Thirty years ago, when the writer first became interested in springs, Bessmer and open hearth steel were undeveloped infants and their uses were mostly experimental for everything except rails and plates. Bolster springs were made mostly of gum, gum and coils of steel around them, and gum in boxes in great variety; also of coiled springs of astonishing variety. There were helices and volutes, round, square, flat, beveled, oval, egg shaped and nondescript sections of bars, used for both bolster and draw bar springs, of steel made of either the old style German steel or of crucible steel. There were double, single and half volutes, and helices in groups of single coils, and others of different diameters one within the other. For elliptic springs we had flat, concave, ribbed and corrugated bars.

These springs were covered by patents as numerous as the varieties, and, of course, each kind of spring was the best in the market. Specifications for springs were limited to space to be occupied and load to be carried. It was go as you please for the manufacturer, scrambling and fun for the traveling men, and all around confusion worse confounded.

Crucible Steel Displaced.

The gradual introduction of open-hearth and Bessemer steels, sure winners because of their cheapness, promptly drove out the gum altogether, and more slowly but inevitably drove out the crucible steel. Crucible car spring steel is still heard of occasionally from the few who have not advanced with the art. The first effect of the introduction of these cheaper steels was breakages innumerable, until careful railroad men were driven nearly wild.

Before crucible steel was entirely driven out one maker was asked to make the lightest possible spring to go into a given space and carry a given load for the then common 30,000-pound freight car. The result was 32 pounds to a group, 128 pounds to a car. They worked admirably, the springs were adopted and many thousands were ordered from different makers. A few months later the same maker was asked to make the heaviest spring he could put into the same space for the same load, because the light springs were breaking faster than they could be replaced. The result was a nest that weighed 72 pounds, or 288 pounds to a car, a gain of 160 pounds for the manufacturer.

Shortly after he was sent for again to consult about a proper specification, to which he replied that the proper specification was to specify his springs, and he was told promptly that the great railroads of the country could not, and would not, be tied to one concern; that although they were buying springs on a five-year guarantee the breakages were so great, even of the heavy springs, that to insist upon the guarantee would, they were sure, break up every one of the spring makers, and that would be the worst break of all. To take a back step and return to gum and crucible steel exclusively would be a confession of weakness in the mechanical department amounting to almost imbecility, and there seemed to be no relief except through a scientific study, careful experiment and proper specifications. This was the beginning of specifications for springs, and probably the leader for many others.

The First Specification.

The first specification of which the writer has any knowledge was for the steel, and was due to our worthy president. He wisely ignored the mode of manufacture and devoted himself to getting the best material consistent with reasonable cost of manufacture, not demanding something impracticable, not expecting a dress suit at a shoddy price, and equally determined not to have shoddy when he paid for good wool. For one, the writer kicked against the close limit on carbon, and all to no purpose. The result was the now famous and almost universally accepted Pennsylvania Railroad specification for spring steel, now known everywhere as the "Standard Specification Spring Steel," and it has proved to be entirely reasonable because it can be made for a reasonable price, and when it is well made it is entirely satisfactory.

Following this, there came from the mechanical department of the same railroad the first reasonable and sensible specification for coiled springs. A circular section, the round bar, was adopted for all coils because the strain was torsional and the round section gave the maximum resistance to torsion.

Calculated from the best known formula for torsion, a complete set of springs was designed for the various uses about a car. Upon the first trial the springs proved to be about 33 percent too strong. This led to a discussion between the spring makers and the railroad engineers as to who was at fault. Naturally each fellow insisted that he was right and the other fellow was wrong. The writer took the matter up by making some springs that were of the specified composition and the bars of the specified size as exactly as they could be rolled on a large scale, not going into a refinement of thousandths of an inch. Then he saw that they were treated properly both in the coiling and in the hardening and tempering. They were certainly about 33 percent too strong.

This led to a consideration of the formula. It seemed at first sight that if torsion were the only resistance the closing down of a coil must lead to a compression of the tempered steel that was simply impossible. Then where did the steel go in compressing the spring? Probably the ends slipped around the base, adding so much to the coils. A spring was placed in the testing machine between two clean, smooth steel plates and the position of the ends marked. Upon compressing the spring the ends did not move. Next the pressure was released, and by means of a small square set against the sides of the spring the diameter was marked on the base plate as well as the ends; then the spring was closed again, and again the ends did not move. A trial with the square now showed that the spring had increased in diameter at its middle height ¼ inch; it was barrel shaped. The spring was 6 inches in diameter and 8 inch high; this meant that the pressure had bulged a 6-inch half circle arch ⅛ inch at the crown, or it had apparently expanded a 6-inch circle ¼ inch in its diameter.

This accounted for the increased strength above the formula requirement, and also when the writer considered the complication of strains involved in a combination of torsion and flexure produced by an end pressure it drove from his mind any further consideration of a formula. There may be mathematicians who could figure it out, but the writer is certainly not one of them.

Carbon Limits.

Assuming now that the springs are formed either by coiling the helices or arching the plates of elliptics, the next operation is the hardening and tempering. Although the differences in temperature necessary to produce the best hardening for different quantities of carbon are apparently slight, as shown by the heat color, they are very important, and are best acquired by the experienced eye possessed by a man of good judgment and not color blind. The hardening and tempering of coiled springs is a comparatively simple matter if the temperer knows the carbon with which he is dealing.

The objection to the carbon limits mentioned before was that we had been accustomed to making springs of every carbon, from 0.60 to 1.30, and the limiting of carbon to 0.90 to 1.10 threw out of use a large amount of steel. Now that specifications have been changed so that coiled springs may be of any carbon from 0.70 to the highest, that objection has been removed, and the results will be just as good if the best conditions are observed.

The lower carbons should be put into the larger bars, because the largest bars are the most difficult to harden safely, and the difficulty increases in a geometrical ratio with the increase in carbon. A good rule is to put the 0.70 to 0.90 carbon into bars of more than 1 inch diameter; bars from 1 to ¾ inch, 0.90 to 1.10 carbon; bars from ¾ to ½ inch, 1.10 to 1.20 or even 1.30 carbon, and little rods below ½ inch into any high carbon up to as much as 1.45.

This was the old practice with crucible steel, and the spring makers were always informed of the carbon they had to deal with. The result was that breakages in the shop or failures

*Read at the Delaware Water Gap meeting (July, 1903) of the American Society for Testing Materials.

in service were very rare. Steel of 0.60 to 0.90 carbon was hardened in water; sometimes, with about 0.90 carbon, a film of oil was used on the water. From 0.90 to 1.10 carbon, about 4 or 5 inches of oil was used on the water, and for higher steel oil was used and kept cool by an external tank of cold circulating water, or by a coil of pipe inside of the tank with cold water running through.

Heat Treatment.

Coiled springs require so little manipulation after coiling that they are usually at a proper heat for hardening as they leave the machine. Care should be taken, however, in heating for coiling; they should be of an even temperature throughout the bar, and neither too hot nor too cold. If they are too hot the grain will be coarse and fiery, and even if they do not happen to break in testing they will be brittle and liable to break in service. If too cold they will not harden thoroughly, and if they do not set in testing they will probably set in service.

As to the heat, it needs to be slightly higher for mild steel than for high carbon. In general it should be just a slight shade above the recalescent point, but that is a matter not readily grasped by the average worker, and a good practice is to aim for a nice, medium orange color for high steel, and a little brighter orange for the milder steels. Good sense and experience and honest attention to the work are the best guides.

Tempering must be suited to the carbons; 0.70 to 0.80 carbon will require very little drawing; 0.90 to 1.10 may require the oil on them to flash, and for higher carbons the oil may be burned off. Above 1.30 carbon a heat that barely begins to show color will generally give a good spring temper. In tempering as in hardening good sense and good judgment are the best guides.

Helical extension springs require more care and exact treatment than compression springs. Whether it be that they are liable to be pulled out so as to be strained beyond the elastic limit, or that the uncoiling is in a continued direction of some strains set up in coiling and so causing more injurious strains, the writer cannot say, but a large experience has demonstrated clearly that extension springs as compared to compression springs are much the more troublesome, so that great care must be used to produce satisfactory results.

In dealing with elliptic springs the problem is somewhat different from that of coiled springs. There are many more pieces to deal with, and each one must be shaped, hardened and tempered separately and then all assembled and brought to a neat fit. The heating for shaping and hardening and tempering should be done carefully, and in general the same as has been described for coiled springs.

It seems to be the fact that there is comparatively little trouble with double elliptics, because, probably, when they are closed down solid they have a bearing upon their two parts, just as a coiled compression spring has, and, therefore, they are not liable to be strained beyond the elastic limit unless they receive a blow that is powerful enough to crush and break the material.

The case of the semi-elliptic, where the spring rests on the middle with the ends turned up to receive the load, as in a locomotive, is very different and is comparable to the case of the coiled extension spring; there is no final bearing for the ends, and by a sudden jar, causing an excessive motion, they may be strained away beyond the elastic limit and broken. It is understood that these springs now give more trouble than any others, and that to get them satisfactory is a serious problem.

The standard specification for locomotive spring steel retains the original low limits for phosphorus, sulphur, silicon and manganese and carbon between 0.90 and 1.10. This is well, first, to insure good material as far as it is possible to get it, and, second, because all of the bars are flat, of nearly the same section, and there is no reason for allowing a wider range in carbon. Steel can be had within these limits without any increase of cost and, now that coiled springs may be of any carbon, from 0.70 to the highest, all off heats can be used for helicals without any loss to the steel maker.

It is a common practice to form the plates in a mold, take them out and adjust them to a templet; twist them a little here, pound them with a hammer there, hold another spot with cold tongs, and finally, when the pieces are shaped to the taste of the operator and are of many different colors of heat and strained here and there by hammer blows, to plunge them into the oil bath to harden them. This is certainly all wrong. It is a quick, cheap way to get out a big product, and it is sure that every plate so treated is dosed with injurious strains that may result in a mysterious and unaccountable fracture.

Plates so manipulated should be put into a proper furnace and brought to a uniform, correct heat before quenching. This heating would remove the uneven strains and make a much better plate. This would require a little care, a little time and possibly a small increase in cost. The question is, would it pay if it increased the life of the spring, reduced the number of breaks and kept the engines longer on the road?

Another point needs attention when hardening in oil, both for helices and elliptics. The oil should be watched, a little fresh oil should be added every day, and finally, when the whole mass has become pretty well burned, so that it appears as if it were mixed with sand, it should be thrown out, the tank cleaned and filled with fresh oil. Worn out oil loses its power of convection largely, and will not harden the pieces as they should be. If it is attempted to correct this by having the springs a little hotter, then the grain will be raised and the result will be fiery, brittle plates and more mysterious breaks.

Like Treatment for Fine and Coarse.

Compared to a fine tool, a razor, or any similar article, a locomotive spring is a comparatively coarse article, but nature did not make one set of laws for steel for milling cutters, taps, reamers, etc., and another set for steel for locomotive springs. The laws are all the same, the strains are the same, the sensitiveness is the same. The average spring steel contains more impurities, phosphorus, sulphur, and so on, than fine tool steel, and just for that reason it is not only not so strong in the tempered condition as the finer steel, but it is also far more sensitive to uneven strains and will break under conditions that a piece of finer steel would endure safely.

In the absence of laboratory tests and exact data on these points it may be well to illustrate them by the action of clock springs and watch springs, which are fine enough to answer the purpose of laboratory work. These springs are spirals, and when well made are really wonderful in their work. Probably every one here has a watch which runs year in and year out with great regularity, and the running is done by a little spring that drives machinery of many times its own weight, often with a variation in speed of only a few seconds a month.

A watch main spring about 0.002 or 0.0003 inch thick, less than ⅛ inch wide, and several feet long, should be made of steel of 1.30 to 1.49 carbon. The first attempts to make this steel in the United States led to trouble, of course. The steel was not uniform in quality and was not properly melted, because it showed all sorts of temper in the same spring. It developed some other tempers also.

The requirement of the spring maker was that the spring must be a perfect spiral. When pulled out straight and allowed to snap back it must coil into a spiral of even space between the coils through its whole length; also it must, when tempered, be of a perfectly even beautiful blue color. Such springs were submitted to the steel makers and they certainly were admirable works of art.

The American springs were of any shape, as far as even coiling went. They touched at one spot, were too far apart at another, and so on; were any color, from a dark, dingy blue to a brown; therefore, the steel was not of uniform quality and so badly melted that the carbon was not evenly distributed. There was no room for argument, the springs told their own story.

The steel makers knew that the steel was uniform in quality and in carbon, that it was thoroughly well melted and that the carbon was as evenly distributed as it was possible to have it in any steel. It was now their business to find the cause of the trouble. After two or three years of struggling with the problem, the cause was found in the annealing. The steel was cold rolled in long strips about 3 inches wide and 100 to 200 feet long. To get it down to 0.003 inch thick it had to be annealed, pickled, washed in lime water and baked about six to eight times, and it can be readily seen that this required great care, skill and close attention.

The annealing was done in boxes, packed with coils of steel filled in with fine charcoal and the cover was luted on carefully. In spite of all care the troubles recurred; some coils made beautiful springs, others were worthless. Finally a wise and expert drawer of fine wire, Edwin Kidd, now of the Globe Wire Company, asserted positively that that steel never could be made right by annealing in closed boxes; it must be annealed in an open furnace so arranged that no flame could strike the steel directly and yet not in a muffle. Then the operator could watch each coil, turn it and watch it until it was heated just right and then remove it from the furnace and place it in a warm, dry place to cool slowly. It was thought that his plan was impracticable, but the case was desperate and the plan was tried with most remarkable results. It was a brilliant success, and that steel soon became famous for its excellence.

What is the explanation? It is very simple when you know, but it was a hard road to travel to the knowledge. In annealing in boxes the steel could not be seen and the heat could not be known. Then the charcoal would become incandescent and run the heat too high, and the coil would be much hotter on one side than on the other. That meant that part of the coil would be of one grain and part of another grain and greatly different structure.

This difference in structure would remain in the steel until the spring was finished and ready for hardening and tempering. The heating would require but a few moments, and when heated the spring would have to be quenched immediately, because its small size admitted of no time for manipulation. Now, although the structure of steel changes rapidly in answer to any change of temperature, yet it does require a little time, and in this case that little time could not be allowed, the grain of the spring could not be evened up, and the result was an uneven spiral, varying color, and a bad spring all around, until the steel was annealed to an even grain and structure.

Consider this now as a long continued, worrying and costly laboratory experiment, and apply the facts to your car and locomotive springs. You are dealing with the same material, it has the same properties, the same forces are at work, and the same results will be had in greater or less degree. Possibly if you consider it seriously you will conclude that it will be worth while for you to be careful in the manipulation of the springs which you wish to have to carry your engines and cars in safety.

Testing of springs is probably well understood and need not be enlarged upon to any great length. All springs are made higher than the finished height to allow for the initial set, which occurs when they are first closed down. This is necessary, because if the temper were left so high that they would not set they would nearly all break, either in the test or in a very short time in service.

It is important in testing that springs be held down solid for a few minutes to allow for lag. A spring may be in a state of unstable equilibrium and endure a quick closing and release without setting too low if soft, or breaking if too hard, and then soon fail in service. This condition can be detected by holding it down solid for a few minutes, giving the necessary time for the strains to develop.

The United States government required springs for mortar carriages to be held down solid for 6 hours. This is just as unreasonable as not to hold them down at all. It is not on record that any spring broke after the first five minutes, but the holding them down for a few minutes under a heavy pressure is important.

Chemical Requirements.

While it is not well, as a general rule, to specify a given chemical composition and a physical test, unless the engineer is a very expert steel maker, it certainly was wise to fix a reasonable maximum of allowable phosphorus, sulphur, silicon and manganese and a reasonable range of carbon. The effect of these elements is well known and excess can be guarded against, as it has been in the standards now adopted by all careful railroads, without any excessive cost or trouble to the manufacturers. It is assumed, of course, and properly, that if the chemistry is correct, the physical condition good and the sizes are accurate, the steel maker's responsibility ceases, and as a general thing the rule works well, but it has its exceptions.

Not long ago a prominent spring maker received several carloads of steel which was well within the chemical limits, was sound and rolled accurately. Upon attempting to work it into springs the blanks nearly all broke in the process of forming. The steel was excessively red short and it was returned to the maker. The cause of this was back of the engineer and chemist, at a point probably impossible to reach by specification, except to claim the right to test for red shortness, and this should be done. There can be litle doubt that this trouble was due to excess of oxygen, an element that cannot well be determined by ordinary analysis. That an excess of oxygen will produce excessive red shortness is beyond dispute.

After many years of analyzing and experimenting by Prof. John W. Langley, supplemented by many tests in the shop, to locate if possible the cause of the difference in strength in the tempered condition between Bessemer, open hearth and crucible steels of practically even conposition, the conclusion was reached that the cause was to be found in the difference in the quantities of oxygen, nitrogen and hydrogen found in the steels. In Bessemer steel great quantities of these elements are blown through the mass. In the open hearth great quantities flow over the surface of the steel for hours and much is absorbed. In the crucible only the amount that is in the pot or that may pass through the sides can get into the steel.

That these elements make a great difference is easily observed when a crucible happens to become uncovered during the melting, as sometimes occurs. If a hundred ingots be topped and set up for inspection and only one has been exposed to flame by the crucible becoming uncovered, the inspector will notice it immediately, mark it "gas" and relegate it to the scrap heap. There is no good reason apparent why an atom of oxygen, nitrogen or hydrogen may not be as potent as an atom of phosphorus or silicon, and they are all present in greater or less quantity. Professor Langley's conclusion was that oxygen is the head devil. The writer held to nitrogen for a long time as his pet mischief maker, but it seems probable that Langley is more nearly correct. These remarks are not meant to belittle Bessemer or open-hearth steel in any way. Their great merits and usefulness are too well established to leave them open to criticism.

The trouble is not in method; it is in the man. Given the best material that the world can produce and it will not make good crucible steel if it is not melted properly, and no subsequent treatment will make a badly melted ingot a piece of good steel. It is the same with Bessemer and open-hearth; bad blowing or bad melting cannot be cured by good chemistry.

The red short steel referred to doubtless came from a wild heat. The melter knew it, the roller knew it and probably the superintendent knew it. They were all working for product, and they knew how to work that steel into pretty bars; but the spring maker did not know how to work it into springs, and it is probably well for his employers that he did not know.

All Depends on Proper Steel Making.

We have now covered the ground that belongs properly to the engineer, the spring maker and the inspector, and have tried to show how the work should be done, how to detect errors and how to correct them. This brings us back to the steel maker and out of the domain of the steel users. All steel is made good or bad in the crucible, the open hearth furnace or the Bessemer converter. If the steel is good there can be no excuse for bad springs, and if the steel is not made good by good melting or blowing it cannot be made good by any subsequent treatment. This matter rests, then, with the steel maker, because it will not do for the engineers or inspectors to attempt to regulate shop practice unless they are ready to assume all of the consequences.

During the latter part of the Civil War the Government sent construction officers to the gun foundries. These gentlemen were to see that the right kind of iron was used and to see the guns cast. They did see that the iron of the recognized standard brands was put into the furnaces, and it is needless to say that they did not know anything about its quality. They also saw the guns cast. This occurred after noon, and sometimes when the furnaces were slow they got in a hurry to go away and would say it was time to cast the guns. The answer always was, "All right; give us a written order to cast the gun, you agreeing to accept the result, and we will cast at

any time you wish." The reply followed, "No, you must submit the gun to all regular tests, of course." And the argument ended, "Very well, we are responsible. We will use our own judgment until the gun is submitted for inspection." The same rule must apply to any manufacturer. If he is to be held responsible he must not be interfered with in his management.

A good melter, of sound judgment and correct eye, knows exactly what he is doing and precisely what he will get. There is no pyrometer or spectroscope that is equal to a well-trained eye to inform one what is going on, and it is doubtful if any machine will ever be invented that will be as useful as a good eye. All that the steel user can do is to plead for good work and be willing to pay a decent price for it. The rush and drive in the mills, the keen, fierce competition of different manufacturers and lively salesmen, and the desire of the purchasing agent to keep down costs, are potent factors for poor work. The engineer wants the best he can get for his purpose, and he often finds that these factors have placed him "between the devil and the deep sea."

It is hoped that what has been said will lead properly to the conclusion that nothing has been suggested that will cost anybody one cent. It is meant only as a plea for honest effort, reasonable care and close attention to every detail. These will result in general satisfaction, and any other course will lead to disaster.

Consolidated Lake Superior Co.

President C. Shields, of the Consolidated Lake Superior Co., has sent an appeal to all stockholders of the company asking them to subscribe to a proposed issue of bonds to the extent of $15,000,000, "in order to save their investment in the property." The financial condition of the company has recently caused its officers and stockholders much concern, and a loan of $5,050,000 was effected after considerable trouble. President Shields tells in detail what has been done by the board of directors toward the providing of funds to the amount of about $9,000,000 to meet the company's needs. Continuing, the statement says:

"The last three weeks have been spent in endeavoring to find a way by which this money could be provided. Inasmuch as all of the assets of the company were pledged to the bankers as security for the temporary loans, of $3,500,000 and $1,550,000, which were made last December, the directors have been obliged to confine their negotiations to the holders of this collateral, as there has been nothing to offer for security for the new loan elsewhere. Efforts have been made to induce the bankers to increase their loans on their present collateral up to $7,500,000, but without success. The only course which is open under the curcumstances is for the stockholders to pay off the present bankers' loans and provide the additional capital which the company must have in order to carry on its business."

Bridge Commissioner Lindenthal states that the Williamsburgh bridge from New York City to Williamsburgh has up to the present time cost more than $21,000,000 and before completed will cost nearly $25,000,000. He estimates that bridge No. 3, the Manhattan, will cost only $16,000,000. Preparations are now being made for inviting bids for the construction of the steel work of the Manhattan bridge. It is stated that three foreign steel manufacturing corporations have sent representatives to this country to examine the specifications for the bridge with the view of bidding for the contract. The contract for the superstructure, which includes the steel towers, the nickel steel eye-bar cables and all of the steel roadways and suspended parts, will be given to the lowest bidder in one lump sum. A bond for $1,000,000 before beginning the work will be required. The contract will amount to about $6,000,000. The American Bridge Co.'s new plant at Economy, Pa., is especially designed for the making of steel eye-bar cables such as will be used in the new bridge.

The next annual convention of the American Boiler Manufacturers' Association will be held at Chattanooga, Tenn., Nov. 10-12. For a number of years it has been customary to hold these conventions in the summer, but it has been thought that the fall would be a more agreeable time.

AN UPRIGHT POWER HAMMER.

The Scranton & Co., of New Haven, Conn., has recently designed an addition to the line of tools this company has developed in a long shop experience. The upright hammer shown in the illustration has been contrived with reference to economy of room in the shop and therefore requires but little floor space. Power is applied at the top of the machine; the ram is guided both in front and rear in order to give an accurate blow; the dies do not come together when the hammer is at rest—and there are other features in the direction of durability and efficiency which will be evident from the engraving and which show the result of practical observation in the forging of metals. The anvil is separate from the frame, a construction which it is claimed greatly relieves the jar when the machine is in operation. This hammer is built in sizes from 25 up to 200 pounds.

THE SCRANTON POWER HAMMER.

The British Iron Trade Association has made application to the government to instruct British consular officers throughout the world to take steps to prepare special reports on the iron ore resources of different countries, adapted to the requirements of the British iron trade. The idea is put forward that if this were done a series of possibly valuable reports could be brought together that would be of notable service to British iron makers in search of the raw materials needed to carry on their industry. The reports may, if agreed to, assume the ultimate form of a special volume on the whole subject. The consuls are to be asked to obtain particulars on all the points that it would concern the buyer and the user of such ores to know. The suggestion is also made in the letter to the prime minister that a royal commission might suitably be appointed to inquire into the question of the iron trade outlook, and more especially in reference to raw materials.

Some Data on Hoisting Hooks.*

BY JOHN L. BACON, CHICAGO.

The following are some results obtained from experiments which had in view a comparison of the strengths of hooks bent out of round stock, and hooks shaped according to Towne's formula, and also the effect of case hardening, or carbonizing, upon the strength of the above hooks. No attempt was made at mathematical analysis, the object being experimental data. The general shape of the hooks tested is shown in Fig. 1. The eyes were welded, and pains were taken to have the lower curved parts of the hooks to be compared as near alike as possible.

One of the conclusions drawn from the experiments was, that if the hook was properly shaped between the points *A* and *B*, Fig. 1, the shaping of the rest of the hook had very little to do with the strength; the shaping of the rest of the hook having more to do with the "hang" than the strength. Of course the critical part for strength lies at about the point *C*, the shape of the lower part merely determining the point at which the load will be applied. All of the hooks tested failed, either by bending or breaking, at about *C*.

When testing, working conditions were reproduced as nearly as possible. The hook was suspended by a loop of round iron run through the eye, the ends of the loop being gripped in the upper jaws of the testing machine.

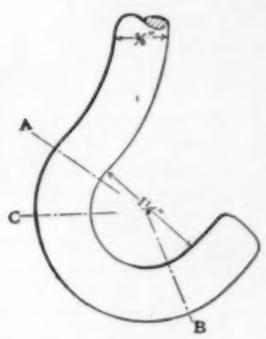


FIG. 1.

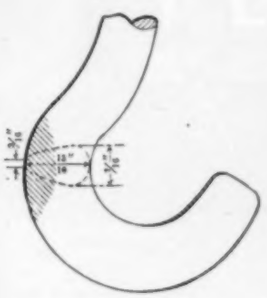


FIG. 2.

A long link of round iron was put over the hook and through the lower head of the machine and a round bar passed through the lower end of the link under the head. This arrangement left the hook free to adjust itself to the strain in all directions. Some of the samples were case-hardened or carbonized. These were heated with granulated raw bone. The ⅝-inch hooks were hot for about 8 hours and the 1¼-inch hooks for about

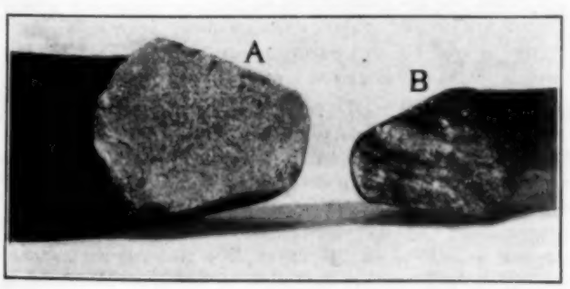


FIG. 4.

9 hours. The depth of penetration of carbon, or thickness of the carbonized coating of the mild steel was about 1-16 of an inch. The ⅝-inch hooks were all made from one bar of mild steel and both 1¼-inch hooks were made from one bar.

In the following table the word "carbonized" is used to designate the hooks which were treated as described above. Those marked simply "carbonized" were allowed to cool in the box in which they were heated; those marked "annealed" were afterwards annealed, and the ones marked "hardened" were hardened in the usual way. Following are the more important data from the experiment:

Mark	Kind of Hook.	Size of Stock	Bend Started at	Max. Load		T. S. of Bar.
				Bent	Broke	
		Ins.				
4	Plain	⅝	2500	3000	.....	62180
5	Plain	⅝	2400	3300	.....	"
8	Plain—Carbonized and Hardened	⅝	4000	.....	4200	"
1A	Plain—Carbonized and Annealed	⅝	2750	.....	2900	"
2A	Plain—Carbonized and Annealed	⅝	2600	2200	.....	"
2A	2A—Bent into Shape and Hardened	⅝	5000	.....	5200	"
X	Carbonized and Hardened—Towne's Shape, Fig. 2	⅝	.....	.....	3000	"
XX	Carbonized—Towne's Shape	⅝	2800	.....	3200	"
-X	Towne's Shape—Untreated	⅝	3000	3800	.....	"
C	Plain—Carbonized and Annealed	1¼	9000	.....	13500	.....
T	Towne's Shape—Untreated	1¼	6000	13000	.....	.....

All of the tested hooks were made in the shops and the testing was done in the laboratories of Lewis Institute.

Figs. 2 and 3 give the dimensions of the flattened hooks. These hooks were made to conform as nearly as practical to Towne's formulæ. The other hooks, bent into shape without any flattening, had the same inside curve as the flattened hooks. The flattened hooks all gave way by compressing the metal

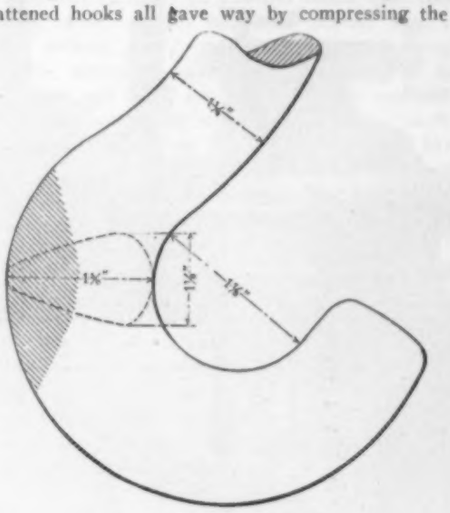


FIG. 3.

shown by the shaded area. This was easily determined as the scale at this point cracked off and was undisturbed on the other parts. All of the hooks which failed by bending stood a much higher load after the bend started; or, in other words, the hooks would stand a heavier load after they were partially straightened out, due, probably, to the fact that as the hook straightened, the leverage of the load was decreased.

The above data would seem to indicate that a hook made from round iron and carbonized, is about as strong as the same shaped hook flattened according to Towne's formulæ, while a plain hook carbonized and hardened is from 40 percent to 50 percent stronger than either of the other two.

The following may prove interesting as showing that the untreated hooks stand greater strains after they start to open. The detail report of the test on hook *T* was as follows: Very slight opening at 6,000 lbs. load; open scant 1-32 of an inch at 8,000 lbs.; strong 1-32 of an inch at 9,000 lbs.; 1-16 of an inch at 10,000 lbs.; ⅛ of an inch at 11,000 lbs.; would not sustain load of 12,000 lbs. any length of time, and opened rapidly at 13,000 lbs.

After the above test, and without disturbing the hook in the testing machine, a load of 13,000 lbs. was applied. The hook carried this load without showing any signs of further opening for about 15 days. At the end of that time the load was increased and the hook straightened almost to a right angle, after which it held a load of 15,500 pounds.

Discussion.

Mr. Fred A. Waldron said:

It has been my privilege, for over fifteen years, to have been

*Read at the Saratoga meeting (June, 1903) of the American Society of Mechanical Engineers.

connected with the manufacturing end of this hook proposition in the works of the Yale & Towne Mfg. Co., and, after careful observation of hooks made of different materials and in different forms, I am at present not only theoretically convinced but practically persuaded that the only proper material from which hooks can be made and be perfectly reliable is of a high-grade puddled iron, such as Burden's best, and that the form should be in accordance with the Towne formula. It has also been my privilege, during the past nine years, to observe the different uses and abuses accorded to hooks in general use. A summary of these observations may be of interest, in connection with Mr. Bacon's paper:

(1) To produce a reliable hook, a material must be used which will stand the abuses of the average drop-forging process, the principal danger in which is in the manipulation required in pointing and bending.

(2) A hook is no stronger than its weakest point; and, while a bar of mild steel may have a higher tensile strength, and, further, a steel hook, properly made, may stand from 25 to 50 percent greater load than a wrought iron hook, it does not follow that the steel hook is better and more reliable than the iron hook.

(3) About a year and a half ago, after a series of laboratory tests, the Yale & Towne Mfg. Co., at my suggestion, decided to change from iron to steel, in view of the fact that steel costs only about one-half as much as the best grades of iron, and, further, that tests of steel hooks showed so much greater strength; therefore, I felt justified in recommending this change. After some thousands of the steel hooks had been made, however, we found that many of them broke from crystallization, while being manipulated in the shop, and that others broke on our block testing machine, on account of the unevenness of the steel and its inability to stand the heat and manipulation under the drop-hammer, all of these defects being invisible. A large number of these steel hooks were scrapped, and the steel purchased for this purpose was used on other work where life and limb were not at stake.

(4) Since then, and at present, all hooks are made from high grade wrought iron, and no further trouble has been experienced, probably for the following reasons: (a) Iron will stand more abuse, in the fire and under the hammer, than any steel yet made. (b) Defective bars of iron are easily detected, either from longitudinal seams in the grain, or from the opening up of imperfectly rolled seams during the processes of pointing or bending. (c) If over-heated or under-heated, the surface defects known as "cold short" and "red short" cracks appear in the bending, and the hook is condemned before it has had a chance to fail under actual service.

(5) A further result of my experience is that one of the greatest strains on hooks of the smaller sizes, say, from ¼ to 2 tons' capacity, is due to the usage which these hooks receive in many shops. Blocks have been returned to us with the hooks opened out, and upon inquiry we have found that the load had been lifted by just catching the point of the hook under the sling chain or ropes.

(6) Iron hooks, made in accordance with the Towne formula, have been returned to us having serious surface defects, which through oversight had passed inspection and reached the customer. Invariably these hooks upon their return have been tested to destruction, and none of them, in spite of these defects, have broken at less than two and one-half times the working load, while we have had several steel hooks break at the working load, without a moment's warning.

(7) Any treatment given to a steel hook, by carbonizing, annealing, or case-hardening, tends to aggravate any invisible defects that may exist, with the exception of crystallization. The latter, undoubtedly, is helped by proper annealing.

An iron hook is less affected than a steel hook by any of the above treatments, with the possible exception of case-hardening, which tends to produce a brittleness in the iron, while it may increase, to a slight extent, its carrying capacity. If, however, a hook is made of the proper proportions, the subsequent annealing or carbonizing, as proved by actual test, may show an increase in the factor of safety, but such subsequent treatments (except annealing) tend to produce brittleness and an additional risk to the operator.

Referring to Fig. 4, A is an end view of a steel hook that broke under nominal load. B is an iron hook that broke under 2½ times nominal load, notwithstanding the flaw shown by the dark area. The steel hook snapped off suddenly, and nearly killed the operator who was testing it. The iron hook opened up gradually before breaking. This is not an isolated case but is a sample of other breakages.

The conclusion I have reached, therefore (based on my experience), is that the best hook for all-round use, for reliability, safety, and to withstand the abuse to which hooks are subject, is a drop-forged hook, proportioned according to the Towne formula, and made of high grade wrought iron.

We have yet to learn of one of these hooks breaking during the manufacturing processes, or developing a defect which cannot readily be detected before it leaves the shop, or failing in service under its normal load.

Proposed Canadian Iron and Steel Bounties.

The iron and steel bounty resolutions of the Canadian government have been made public. It is proposed to give a bounty of $6 a ton on wire rods sold to manufacturers of wire. On large steel plates now admitted at a low duty there will be a bounty of $3 a ton on such made in Canada. The same bounty is proposed for structural steel. On steel ingots, puddled bars and pig iron it is proposed to give the same bounty as last year, the gradual reduction which began last year being suspended for this year. Under the gradual reduction the bounty will be off by 1907. It is also proposed to pay a bounty on binder twine equal to the export duty exacted in the Philippines on Manila hemp.

E. F. Du Brul, of Cincinnati, has bought approximately 500 acres of land, and has an option on 1,200 more in Jackson County, Ohio, which contain all necessary materials for making the highest grade of Portland cement, superimposed one on the other, namely, coal, limestone and shale. The land is favorably located as to transportation facilities, having two railroads on the ground, and Mr. Du Brul is organizing a cement company to erect a plant with a capacity of 1,200 barrels, for a start.

The Cresson Foundry, Machine & Car Co., recently incorporated, has been organized at Cresson, Pa., by the election of the following officers: President, John W. Kephart, of Ebensburg; vice president, P. B. Cosgrove, of Hastings; secretary and treasurer, R. Edgar Leahey, of Ebensburg. The board of directors has decided to increase the capital stock from $5,000 to $10,000. The plant of the Cresson Machine Co., which now employs some 40 men, will be taken over and greatly enlarged.

Building for June in twenty-three of the principal cities of the country shows a loss of 10 percent as compared with the corresponding month a year ago. According to special reports to *Construction News*, permits were granted during the month just closed for the construction of 7,430 buildings involving a cost of $32,166,268, against 6,559 buildings aggregating $35,885,980 in cost for the corresponding month a year ago, an increase of 781 buildings and a decrease of $3,719,712.

The Macbeth Iron Co., Cleveland, recently booked an order for two of its 42" and 84" x 54" blowing engines for the Roane Iron Co., Rockwood, Tenn. It also has one of these engines in course of erection at the furnace of the E. & G. Brooke Iron Co., Birdsboro, Pa., which it expects to have running in a week or ten days. The two engines recently erected at the Scottdale, Pa., plant of Corrigan, McKinney & Co. have now been in continuous operation for over three months and are giving entire satisfaction.

The Lockhart steel mills at McKees Rocks, Pa., will be closed until July 20, pending the making of repairs. The McClintic-Marshall Construction Co., which has been doing a large amount of structural work for the Pittsburg & Lake Erie railroad in McKees Rocks, has completed its contract and begun the removal of the equipment. About 1,000 structural workers were employed on the contract.

EASTERN PENNSYLVANIA.

HARRISBURG, Pa., July 14.—The intense heat of the first ten days of July caused considerable loss to the iron and steel manufacturers of this part of the State, some of the mills having their product reduced over a third.

There is a good feeling, especially among the larger companies, for orders have been placed to a considerable extent. The demand for rails, bridge and construction work and plates is reported large and a number of good-sized orders have been booked for fall delivery.

An official of the Pennsylvania Steel Co. said a few days ago that there would be lively operation of the company's works for the rest of the year. The same view is taken by people connected with the Lackawanna, Thomas, Reading and other iron companies. The Susquehanna Iron & Steel Co. is starting up more mills.

The Williamsport board of trade has secured for that city the Sweets Steel Co. of Syracuse, maker of rolled steel, and a large plant will be located on twelve acres given as a bonus for location. Similar efforts are being made by the boards of trade of Harrisburg, Reading, Lancaster and York.

The stockholders of the Carpenter Steel Co. of Reading have voted to issue $1,500,000 of 6 percent stock, making the total capital $3,500,000. The company is busy on government work.

The Eastern Steel Co. will build two additional open-hearth steel furnaces at its Pottsville plant which is being greatly enlarged.

The steel and rolling mills of the Harrisburg Pipe & Pipe Bending Co. will be started within a few weeks.

Steps are being taken for rehabilitation of the Spang furnace at Lenhartsville, Berks County.

The Empire Steel & Iron Co. has put its No. 2 Henry Clay furnace at Reading out of blast for repairs. The company intended to suspend work at its Macungie furnace, but the men agreed to accept a reduction and it will be kept in operation.

The Moore & White Co., of Philadelphia, has been incorporated for the manufacture of iron and steel castings; capital, $10,000. The officers are J. H. Moore, J. A. White and S. A. Hibbs.

A new company to be known as the Reading Detachable Chain Co. has been formed with a capital of $10,000. It will build a large plant. D. P. Brisse is at the head of the concern.

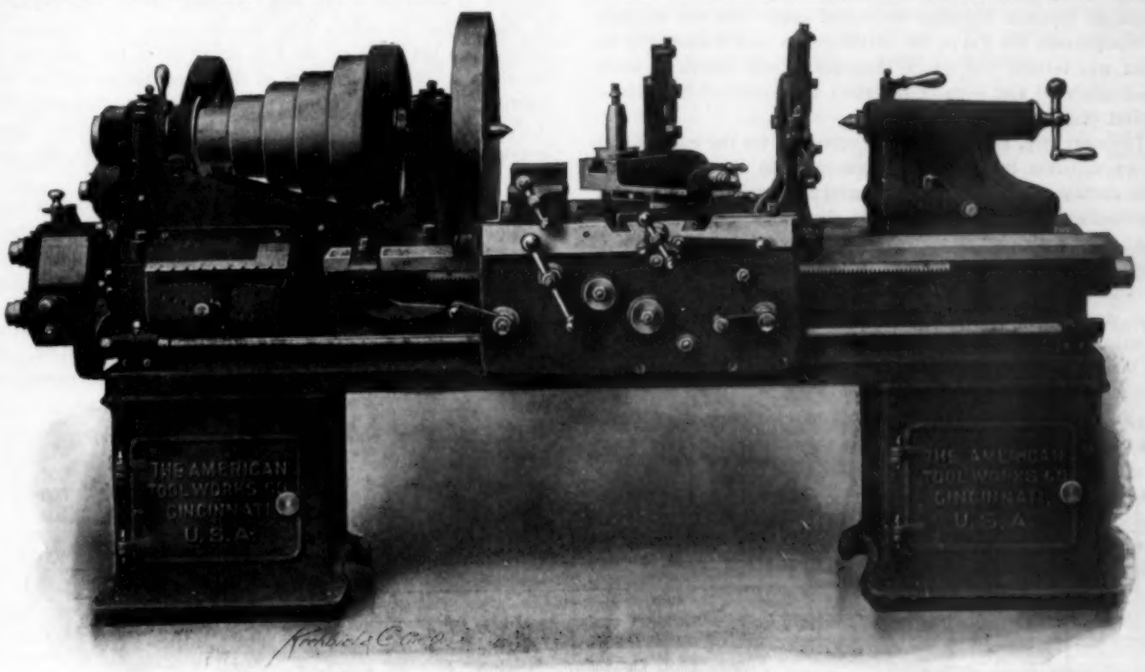
Fire did $25,000 damage to the plant of the Standard Steel Co. at Lewistown. The company will at once rebuild the burned building.

The Harrisburg Foundry & Machine Works have booked an order for a 500-h. p. engine for the new plant of the Lincoln Traction Co. and for three similar engines for the Centre and Clearfield electric railways.

The Reading Gas Fixture Works have been formed with $15,000 capital and will build a plant at Reading when incorporated. A. N. Kissinger is president.

NEW 20-INCH "AMERICAN" ENGINE LATHE.

The accompanying illustration shows a 20-inch engine lathe, just brought out by the American Tool Works Co., Cincinnati. Recent developments in modern shop practice and the present extensive use of special high speed steels have shown the ordinary engine lathe to be inadequate to the greatly increased duties now imposed upon lathes. To meet the changed conditions and new demands, this improved "American" lathe has been built. The rapid change gear mechanism, a new feature, provides a range of 44 changes for feeding and screw-cutting, each change instantly and easily available while the machine is in full operation, without removal of a gear. Index plates show clearly how to obtain any desired thread or feed. The operation is simple and the possibility of error so remote that an unskilled apprentice can be trusted to handle the machine.



NEW 20-INCH "AMERICAN" ENGINE LATHE.

Steel gears are used wherever necessary. The bed is of deep section, of patent drop V pattern, which allows 2 inches additional swing, and has rigid construction. The headstock is heavy and firmly bolted to the bed. The spindle is high carbon steel, accurately ground, with a large hole running through it. The tailstock is strongly built, of the offset type, with graduated spindle. The carriage is heavy, especially in the bridge, due to the drop V bed, with long continuous bearing on the ways. The lead screw is on the inside of the bed, and imparts motion to the carriage directly under the cutting tool, thus centralizing the strain. Half nuts are operated by a lever at the front of the carriage. The makers lay stress on the exceptional producing capacity of this machine, its strength to stand up to continuous service at fast speeds and heavy feeds, its simple construction, and the convenience and rapidity with which all feeds and speeds may be handled.

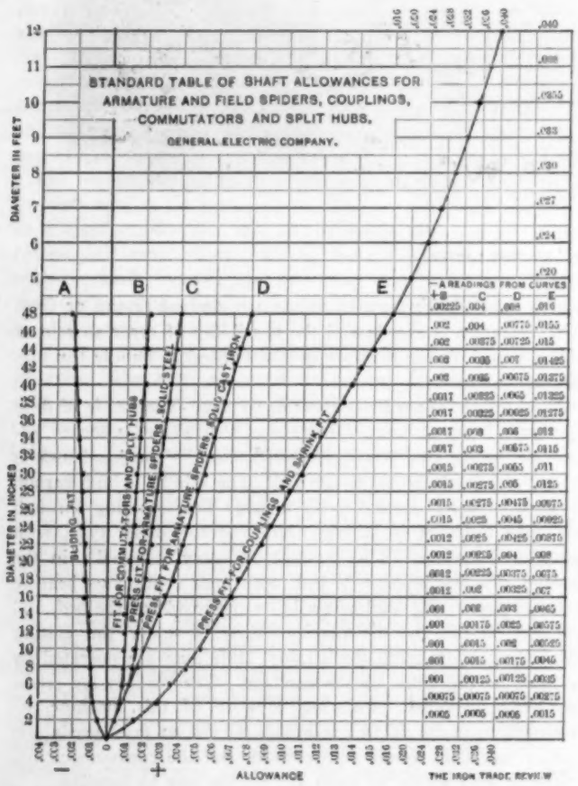
The Chattanooga Furnace Co. has withdrawn from the Southern Furnace Association and is now an independent furnace company.

FITS AND FITTING.

A paper under the above title by Stanley H. Moore, Kansas City, Mo., was presented at the Saratoga meeting of the American Society of Mechanical Engineers. It was an investigation of recent practice in forcing, shrinking, driving and running fits and limits for limit gauges. The crude or working material forming the basis of investigation has been published in the past few years in various technical papers. The data were divided into two classes: that which bore the stamp of scientific investigation, and that which was submitted as the successful practice of some individual or concern. The second class forms by far the greater portion of the data investigated. The paper explains in brief the method of procedure in the deduction of the formulæ, representative curves and tabulated data. The matter was divided for convenient treatment into the following classes: forcing fits, forcing fit pressures, shrinking fits, driving fits, running fits, and limits for limit gauges. The data were transferred to rectangular co-ordinates where the curve was plotted, the ordinates representing the diameters in inches; the abscisses the allowances. The result of this first plotting was the deduction of an empirical formula for each individual case. For the purpose of comparison the curve for this formula was transferred to what was termed the typical diagram. Such curves as were obviously wild and wide of the mark were omitted from these typical diagrams.

The next step, and one deemed necessary for the compilation of an accurate table to fit allowances, was the selection or construction, from the typical diagrams, of what were termed representative curves which would clearly indicate good practice. The choice of these representative curves, being largely a matter of judgment, is open to criticism; however, the selections were made with a view to securing a simple formula that would at once embody the essential features of good practice and omit nothing of importance.

During the discussion Mr. John Riddell, mechanical superintendent of the General Electric Co.'s plant at Schenectady, N. Y., submitted the diagram shown herewith and the following comment:



"I have read the paper by Mr. Moore with a great deal of interest, and am very glad to see that some effort is being made to get the matter of allowances put in some tabulated form for future reference. I am particularly interested in this subject at this time, as I have prepared a diagram for our own use and was just about to issue it.

"In making up such tables and diagrams, it will be found a very difficult undertaking to make them to suit all conditions, as I will try to point out. Before making any change in our present allowances I wrote to a number of engine builders for their opinion regarding the change and received answers from about forty of them. The answers furnished very interesting reading matter. Some suggested that the present allowance was all right, others said the proposed allowance would be about right, while still others said it was not enough.

"My reasons for changing were: First, to have a gradually increasing allowance, and not in steps by 3 or 4 inches, because I contend that if an allowance is right for 10 inches the same allowance would not be right for 14 or 15 inches. Second, our old allowance is 50 percent smaller than the proposed allowance and gave no leeway to the shaft turner. There are many things to be taken into consideration in laying out these tables and diagrams: First, the relation of length of bore to diameter. In our case the length of hubs of armature spiders are sometimes several times the diameter; but the actual bearing surface is about equal in length to the diameter, on account of recesses in the hub. Second, the outside diameter of hub should be taken into consideration. My diagram is laid out on the basis of the hub being twice the diameter of the shaft. Third, the nature of the materials should be considered. Fourth, how and where the parts are to be assembled; if they are to be assembled where a suitable hydrostatic press is available, more allowance can be made than if the parts are to be put together by the use of bolts and straps.

"My diagram is based on actual experience extending over a number of years, and the one we have at present in use is eminently satisfactory. In laying out the diagram we took the largest bore we had made and different smaller ones down to 2 or 3 inches, and plotted the curve to suit.

"In my diagram I differ very widely from Mr. Moore in all of his tables, and also in some of his general deductions. By comparing some of his tables with our own experience, we have:

	FORCING FIT.	
	Moore.	Riddell.
6 inches	.0125	.00125
12 inches	.0245	.00425
24 inches	.0485	.0045
30 inches	.0605	.0055
37 inches	....	.0065
	SHRINK FIT.	
	Moore.	Riddell.
6 inches	.0069	.0035
12 inches	.0133	.0057
24 inches	.0260	.00925
30 inches	.0324	.011
38 inches	....	.01325
12 feet	....	.040

"It will be noticed by the above that Mr. Moore allows about ten times more for pressure fits than in my proposed table. It will also be noticed that Mr. Moore allows less for shrinkage than for pressing, while my table gives double the amount.

"I would like to call attention to another statement in Mr. Moore's paper, in which he says more skill and experience are required for shrinkage than for force fits. I have seen a great many fits of both kinds made and never heard this statement made before. If a piece is being bored for shrinkage, say about 48 inches diameter, we would allow .016 inch; but if the same piece was to be bored for forcing fit, we would only allow .008 inch. Two or three thousandths would make very little difference on the shrinkage fit, as we would be sure to have a tight fit if there was such a variation either way, but in the case of forcing, if .003 inch were taken from .005 inch the pressure would be insufficient, and if the same amount was added, the pressure would be entirely too high.

"One of the reasons for making my table was to have something for the guidance of our designers and draughtsmen. There are five curves shown as follows: The left-hand one on the minus side of O line shows allowances for sliding fit. I mean by this such fits as are not loose or free like a running fit, but one that will just slide without any perceptible play.

The next curve is on the right or plus side of the O line, and shows exactly the same allowances for tight fits, for parts with light hubs, such as commutator shells, etc. The third curve gives somewhat greater allowances, and is used for steel hubs. The fourth is for our regular armature spiders of solid cast iron hubs. The fifth shows the amount we have found to be correct for shrinkage fits, and for such heavy articles as couplings. Our bearings, or running fits, are not given as it was not thought advisable to put too much on one sheet."

IRON INDUSTRY OF THE BIRMINGHAM, ALA., DISTRICT.*

BY S. S. KNIGHT.

The amount of pig iron produced in 1902 in the Birmingham District was conservatively valued at $270,000,000. In its manufacture over 500,000 people were continuously employed, while the subsequent refining and elaboration of this material furnished occupation, more or less directly, for no less than four million of wage earners. At least $750,000,000 is invested in the coal, ore and limestone properties, coke oven and furnace plants which are the necessary factors in the manufacture of pig iron. The conditions which favor the commercial production of pig iron are large deposits of coking coal, iron ore and fluxing materials in close proximity to each other, all of such chemical composition as to be suitable for use.

The areas underlaid with fuel in the Birmingham, Ala., district are distinctly divided into three great coal fields, the largest of which is now almost equal to the Connellsville in its celebrity, while the quantity of coal available in it is vastly greater than that in the Pennsylvania field. This Warrior field has an area of over 7,800 square miles; in some places as many as seven seams are workable, while some single veins have over seven feet of clear coal, and in places twelve feet of coal occur, with less than six inches of parting. It is estimated that this field contains no less than 30,000,000,000 tons of coal, which would be about equal to a block of coal having a base of one square mile and whose each lateral face was a mile and four-fifths high. Practically every acre of coal in this field is admirably adapted for coking purposes, although as a steam coal it has almost no equal. The better grades will analyze about as follows: Moisture, 3.50 percent; volatile matter, 30 percent; fixed carbon, 61.50 percent; ash, 4.50 percent; sulphur, .75 percent.

While the sulphur as a rule runs fairly high in this coal, it is in such a chemical combination that it is easily disposed of by washing the slack, and by this method furnace coke is produced of a very satisfactory grade. As a usual thing such coke will have about the following composition: Moisture, 1 percent; volatile matter, 1.5 percent; fixed carbon, 85 percent; ash, 12.5 percent; sulphur, .85 percent.

Coke, however, is produced from coals found in this field which, when made from washed slack, has an analysis about as follows, and is well suited for foundry work, even in the production of very thin castings, which must necessarily be soft: Moisture, .5 percent; volatile matter, 4 percent; fixed carbon, 85 percent; ash, 10.5 percent; sulphur, .51 percent.

A glance at the composition of this coke will show that it is equal chemically to the best produced in West Virginia, while it is superior to that made in Pennsylvania or Virginia. In physical structure it is somewhat inferior to the best northern brands, and it is much to be regretted that as yet but little of this coal capable of producing the above coke has been mined, although it is known to cover a large area. The coals found in the Warrior field are generally of a quality but little suited to domestic use, which is largely due to the fact that they have a decided tendency to disintegrate when exposed to the air for any considerable period of time, particularly if left uncovered to the sun and rain.

The two fuel sections of secondary importance in the Birmingham district are the Cahaba field, to the south of the Warrior, which covers about 400 square miles, and whose available coal is estimated at about 3,000,000,000 tons, and which is generally of excellent character, either for the production of gas or domestic use; and the Coosa coal field, which is of about the same area as the Cahaba, but whose available coal is estimated at 450,000,000 tons, the most of which is capable of producing an excellent grade of furnace coal.

Alabama has now built and in blast 7,500 coke ovens, 450 of which are of the by-product type, and whose production of coke for the last year was over 2,200,000 tons, practically all of which was used in the Birmingham district.

From an economic standpoint Alabama's iron ores readily divide themselves into two classes, the red and brown ores. The former are by far the more important, since they are so persistent and are available in such an enormous quantity. Geologically in the Clinton formation of Silurian time, being far below the coal measures, their strata vary in thickness from 4 to 30 feet, and dip usually less than 20 degrees toward the southeast. Their persistence is well shown by the fact that in one locality an entry has been driven over 1,000 feet into the vein without any decrease in its thickness being observed. These strata outcrop continuously over a distance of more than twenty-five miles, while in some places ore is being taken out within less than seven miles of the tipples of the coal mines. This red ore is further distinguished as either hard or soft, according to the analysis and physical constitution; the hard ores being more or less self-fluxing, owing to the presence of about 15 percent of lime. The average analysis of each character of material is about as follows:

	Hard Ore.	Soft Ore.
Iron	38.00 percent.	47.50 percent.
Alumina	3.00 percent.	13.50 percent.
Silica	13.50 percent.	17.00 percent.
Lime	16.00 percent.	1.00 percent.
Water	.50 percent.	7.00 percent.
Phosphorus	.30 percent.	.35 percent.

The phosphorus in the red ores will vary from .25 percent to .40 percent, but in no case has it ever been found below the malleable limit. Such an enormous amount of this ore is available that it has been estimated that if all of the coal which now lies in the State were turned into coke, but half of this deposit of ore would be used when all of the fuel was exhausted in the production of pig iron. So close to the furnaces does this ore lie and so thick are the veins that it has been placed in the furnace stock houses for less than 70 cents per ton, while it is not probable that, even with the high rate of wages prevailing last year, its average cost at the furnace was over 90 cents per ton. As ordinarily used this ore constitutes between 75 and 90 percent of the furnace burden. In mineralogy these red ores are known as hematites, meaning that they are unhydrated oxides of iron.

The brown ores, which are either carbonates or hydrated oxides of iron, constitute less than 25 percent of the bulk of ores mined in the State, although it is from them that the best foundry iron is made. Since they lie entirely in pockets, their continuity is at best a matter of speculation, which usually turns out to be unfortunate for the mine operator. Owing to this formation the ore is always more or less mixed with clay and dirt, which necessitates washing before using in the furnace. This materially adds to the cost, which however is partly offset by the greater quantity of iron which they contain. An average analysis would be about as follows: Hygroscopic water, 5 percent; combined water, 6 percent; iron, 49 percent; silica, 10.5 percent; alumina, 3.5 percent; lime, .5 percent; sulphur, .1 percent; phosphorus, .4 percent.

This ore varies in its phosphorus content from the Bessemer limit to 1.25 percent, while samples have been seen which carried from .6 to 2 percent of manganese. The cost of brown ore averages about $1.25 per ton in the furnace stock houses where the haul is short, and up to $2.25 per ton where the mines are located some 100 miles away from the point of consumption. It may be well here to remark that furnaces using all brown ore have always been able to obtain a better price for their product upon the market, owing to the fact that the same grade of brown ore iron will be much stronger than the similar grade of red ore iron, providing the elements other than carbon and iron are about in the same proportion in their respective compositions. This is largely due to the fact that brown ore reduces much higher up in the furnace, and thus acquires more carbon as it descends into the crucible through the incandescent fuel. The quantity of ore mined in

*Read at the Milwaukee meeting of the American Foundrymen's Association.

the district during the last year was something in excess of 3,000,000 gross tons.

The occurrence in enormous quantities of the carbonates of lime and magnesia in the Birmingham district has been one of the greatest factors tending toward its marvelous growth and its increasing industrial importance. Within a distance of less than ten miles from the outcrop of a 25-foot vein of ore and the entrance to a coal mine having a 7-foot seam is to be found practically an unlimited supply of the purest dolomite.

It is the character of this deposit and its prevalence in this district which makes the future of Birmingham certain from a steel-making standpoint. Not only is basic iron easily produced when this material is used as flux in the blast furnace, but the basic open hearth steel made from this pig iron is found to be at least equal to, if not better, than that made in like manner in the Pittsburg district, the Birmingham steel being somewhat to be preferred for structural work. The cost of this material in the furnace stock houses does not exceed 50 cents per ton, while within seventy-five miles of Birmingham are found such large deposits of limestone as to insure for thousands of years a sufficient supply of this material. This material would cost when placed in the stock housé not to exceed 65 cents per ton.

Twenty-three years ago there were but four blast furnaces in the district, two being located at Oxmoor, and the two Alice stacks, which are within the city limits of Birmingham. Both of these plants are at present in operation. From 1880 to 1888 twenty-one furnaces were built and put in blast in Jefferson county, all within fifteen miles of Birmingham, and only one of which is not at the present time in operation. During 1900 the largest iron producer in the South was erected and placed in blast the following spring. Today there are in blast in the immediate district twenty-six furnaces, while there are in various parts of the State, more or less immediately adjacent to the district, twenty-four other pig iron producers. Last year Alabama made almost a million and a half gross tons of pig iron, while the prospect so far this year points toward a decided increase in production. Within the last few years the physical condition of the plants in the distirct has been greatly improved, while the advance in furnace practice has kept well apace. Where in some of the older plants it takes nearly two tons and a half of coke to produce a ton of iron, and single stacks give a daily output of 150 tons, the latest addition to Alabama's list of furnaces has made iron with less than a ton and two-tenths of fuel while producing at the rate of 335 tons per day. The breadth of the market reached by Birmingham iron is almost as extensive as the location of civilized man, since shipments have been made to England, France, Holland, Denmark, Norway, Switzerland and Austria, in Europe; India, China and Japan in Asia; Australia; Argentina and Brazil, in South America, besides Cuba, Mexico and Hawaiian Islands.

In March, 1888, in the Henderson Steel & Mfg. Co.'s plant at North Birmingham, was made the first steel produced in this district. While this plant was purely an experiment, and has since entirely ceased operation, the Birmingham Rolling Mill Co., now a part of the Republic Iron & Steel Co., has been commercially manufacturing basic open hearth steel for over six years. They have two furnaces, which have an output of about fifty tons per day. The ingots cast here are bloomed down and rolled into merchant shapes in their adjoining mill, which has a capacity of 500 tons of merchant bar iron daily, made from their puddling furnaces in this plant. This same company operate a mill at Gate City, a suburb of Birmingham, which has a capacity of 100 tons of merchant bar per day. These plants, together with the bar and plate mill of the Tennessee Coal, Iron & Railroad Co. at Bessemer, and the tube mill at Helena, of the Alabama Tube Co., represent the puddling branch of the iron industry of this district. At Ensley the Tennessee company erected their steel mill some four years ago, which has a capacity of 1,000 tons of basic open hearth steel per day, while the ten 100-ton furnaces are supplemented by a 44-inch blooming mill and a rail mill, comprising in all, with the single exception of the Homestead Works of the United States Steel Corporation, the largest basic open-hearth plant in the world.

It has been recently estimated that the iron foundries of this district consume no less than one-half million tons of pig iron annually. Among the more prominent of these, on account of the high grade of finished machinery which they turn out, are several concerns manufacturing Corliss engines and sugar-house machinery. Besides these engine builders there are three water-pipe plants, with a capacity of no less than 150,000 tons per annum; eight soil-pipe plants, with a capacity of 40,000 tons per year; one car-wheel plant, one stove foundry, three boiler shops, besides numerous smaller foundries.

As much as the Birmingham district already has, she lacks some important elements tending to her complete success in the iron industry. Chief among these is a malleable iron plant; nor are there any reasons apparent why she should not have one. There has already been produced in this district over 3,000 tons of pig iron whose phosphorus was below the Bessemer limit, and there are two well-known ore deposits whose phosphorus is easily below the malleable limit, while a smaller quantity of ore has been prospected which contains over 38 percent of manganese. About 350 miles away are the phenomenally low phosphorus magnetic ore deposits of East Tennessee and Western North Carolina, and in this locality malleable pig iron of high reputation was produced for years. With the opening of the Warrior River to navigation, which it is estimated will be accomplished within the next two years, and the building of the canal across the Isthmus of Panama, this district will be placed in a position to dispose of its products in any quarter of the globe wherever the market conditions are the most advantageous.

Annual Iron and Steel Statistical Report.

We gave last week a number of the more important statistical tables from the annual report of the American Iron and Steel Association. There is no publication comparable to this or like it, in any of the iron producing countries, and the present report has enlarged upon some of the prominent features of those of other years. Particularly is this true of the pig iron tables. Special attention has been paid to the statistics of imports and exports of iron and steel, iron ore, manganese ore, coal and coke. Canadian statistics are fully given and there are details of the world's production of iron and steel and iron ore and coal in 1901, with detailed statistics of the annual production of iron and steel, iron ore and coal in the five great iron and steel producing countries from the earliest period for which authentic statistics are available. The price of the report is $3 and it is sent postpaid from the association's office in Philadelphia.

The Garry Iron & Steel Co., of Cleveland, notes a marked improvement in business recently, after a period of slackness, and expects, as labor conditions become more settled, there will be a general increase in demand and stimulation in prices. Among recent contracts the company has taken are the following: Structural steel work for street railway bridges at Roseville, O.; at Triadelphia and at Malta, O.; also a contract for furnishing and erecting a steel bridge for the Delaware & Magnetic Springs Railway Co. Recent contracts for structural work include the furnishing and erecting of a steel building for the Lackawanna Lumber Co. at Cross Fork, Pa.; for The Union Carbide Co., at Sault Ste Marie, Mich.; a large extension for the Cleveland City Forge & Iron Co.; structural steel and sheet metal work for condenser room, retort house and coal house for the Akron Gas Co., and also a building for the Brooklyn Cooperage Co., at Laquin, Pa. An order recently received from the Louisiana & Arkansas Railway Co. calls for a form C 3,000-pound pneumatic crane for coaling locomotives, also twelve drop bottom coal buckets. Other orders in this line are for a 5-ton pit jack from the Union Traction Co. of Anderson, Ind.; four 5-ton pneumatic jacks for the Boston & Albany Road; one No. 3 warehouse crane from the McCormick Division of the International Harvester Co., of Chicago, and twenty Garry pneumatic jacks with special trucks, for the Chicago, Rock Island & Pacific Railway.

J. K. Dimmick & Co. have taken a contract for about 150 tons of pipe for the Kenton Water Co., which supplies South Covington and Latonia, Ky.

IRON ORE DEVELOPMENT IN UTAH.

(Special Correspondence.)

CHICAGO, July 14.—Recent press dispatches from Salt Lake City have announced the organization of an iron company there to mine and smelt ores from the Iron Mountain district of southwestern Utah. Early development there is far more probable than these dispatches indicate or than is generally known. The details given below are the result of personal investigation by your correspondent on the ground.

It is now unquestioned by mining engineers who have seen the region that it contains a very large deposit of ore, that it is of fair quality and easily mined. Reports have been made by some well known iron ore experts who are familiar with Lake Superior mines. These have quite generally agreed in the statement that ore exists in probably very large quantities, but they have found that it is largely non-Bessemer and that the questions of water, fuel and flux for the furnace, as well as transportation, have been so serious as to make the opening of these properties a problem of an intricate mature particularly so if smelting near the mines is intended. The transportation question is solved today. The coke question is very much nearer solution than is imagined; indeed it may also be said to have been settled successfully. No sane man would attempt to smelt those ores at the mines. He would haul them to Salt Lake, for the market west of the Rockies, or to Pueblo for that to the east of the mountains and west of the Mississippi, or to the Pacific coast for the trans-Pacific trade.

By the developments of a month past either one of these points is available. The Oregon Short Line road is now the property of W. A. Clark, of Butte. He has bought it. Within the past two weeks he has financed a plan for the extension of the road from its present terminus in the mountains on the southwestern corner of Utah to the coast, a distance of about 500 miles. Materials and supplies are now on the ground and this road is to be pushed for all it is worth. This is an indubitable fact. The completed and operated portion of this line passes 30 miles west of the iron district, and this short space is a level plain, easy for railway construction. A spur is to be laid at once to the mines, and there will be connection with Salt Lake and later with the coast.

The Rio Grande Western road is to build southwesterly from a point on its main line to the ore region, in order that the Colorado Fuel & Iron Co. may have access to these fields. This is said to be a settled policy.

In east central Utah, on the line of the Rio Grande Western road, coal fields have recently been opened by men owning large parts of the ore deposits. This coal has been found to make an excellent furnace coke—a coke carrying more than 90 percent fixed carbon, less than 0.5 sulphur and but a trace of phosphorus. It is very firm and granular and should carry a burden well.

Col. S. B. Milner, of Salt Lake, who is one of the earliest as well as largest holders of lands in the ore district, has closed a contract for the delivery of 400 tons of ore daily for a Western works, delivery to begin when railway connection is made. He is now at work opening out ore for this operation. Col. Milner and associates have plans for iron and steel works, to be erected on the shores of Utah lake, some 20 miles south of Salt Lake City, and it is stated that they have the money assured them for this work. They propose to build, at once, the first two of a series of furnaces, of 150 tons capacity each, and work may be started this summer. This is the initial development of an iron industry west of Pueblo and as such is entitled to careful consideration.

The iron ores of this region were known to Mormons many years ago, and attempts were made 40 years ago by them to smelt at the mines. The great obstacles then in the way, not less in any sense and in some much worse, than those that beset the smelting of Lake Superior ores at Marquette 50 years ago, caused the abandonment of the undertaking and the withdrawal of all inhabitants from the spot. Four years ago Messrs. Milner, of Salt Lake, and Dear and Lerch, of the Mesabi range, became interested and took up a large acreage where immense magnetic outcroppings showed themselves. They did a large amount of test work and surface exploring, and satisfied themselves of the value of their properties. Col. Milner himself also took a large acreage. Within the past few months others have gone in and taken lands, until now everything that appears to be of most value, either from outcroppings, showings in shafts and trenches, or from the geological indications, has been covered under the various land acts. The Colorado Fuel & Iron Co. has been most active in this work. It now controls about 25,000 acres on the formation. Duluth, Minn., and Cincinnati, O., parties own about all that is left.

The Colorado Fuel & Iron Co. is proceeding in this region on a very large scale, and the size of its initial and preparatory operations are such as to leave no doubt in the minds of any who have seen them and become acquainted with their work, that they not only are fully convinced of the value of these lands, but that they know exactly what they are going to do with them so far, at least, as transportation is concerned. This means nothing less than an understanding between the steel company and the Rio Grande Western, ownership in both of which is largely identical. It is probably between 500 and 600 miles from Iron county to Pueblo by any route that a road can take.

More than 200 men are now engaged in preliminary operations for the Colorado company, testpitting, shaftsinking, trenching, and in all the many details of work necessary in such a district. This force is to be increased as occasion permits. The men are under charge of competent mining engineers from the Lake Superior region. A large force is at work for S. B. Milner, in preparing for actual mining and in explorations throughout the district. As the region is reached only by team and is 35 miles from the nearest railway station across a waterless and shadeless desert, the meaning of what is under way there now is considerably greater than the same quantity of work would be in many other districts.

It is unfortunate that these ores are, so far as explored, largely non-Bessemer, but there is hope that phosphorus may diminish as explorations are carried on and a better knowledge is had of the region. This hope is based on what is actually being found in some of the deeper workings. Ore exposed on surface is dense magnetite, but a fine soft hematite is found where there has been no disturbance, and this is probably in far greater quantity than the magnetic oxide. Results so far seem to indicate immense deposits, but on account of the scarcity of exact data, of the meagerness of development to date, the little knowledge of the extent of the field, any estimate of the quantity of ore in sight could be nothing but the wildest guess. This much is safe: One can drive for 20 miles among a formation where outcroppings are frequent and float ore is always present, where nearly every pit sunk has bottomed in ore, and where the formation is occasionally found to be very wide. Extending along the general strike of the range, northeast and southwest from this central portion, there are some indications that the field extends for as many miles more, each way. The probabilities are, however, that these outlying areas are not as prolific as that in the central portion. This central portion extends from the deserted Mormon village of Iron, founded in 1862, to what are known as Desert Mound and the Lindsey hills. It is not believed that the formation is very thick, but there are many pits 100 feet deep that are in ore all their depth.

A block to any plan of smelting ores in the mining district is the scarcity of water. It is also a serious hindrance to exploration and to any attempt to make mining settlements. But it is not to be imagined that if this ore is needed water can not be found somewhere in the vicinity. Deep well drilling has never been tried, and there are mountains a few miles away whose melting snows can be made to furnish water the year through.

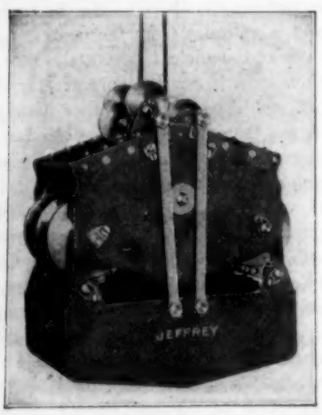
The La Follette Coal, Iron & Railway Co., La Follette, Tenn., has blown in again after three weeks of idleness on account of the breaking down of its blowing engines. The company started July 10 and is running in better shape than ever. It is putting in a new blowing engine and new hot blast stove which will be ready to start by Aug. 15. This is an independent furnace company and is represented by the Field-Evans Iron Co.

JEFFREY GRAB BUCKETS.

Perhaps no more interesting and important problems from an economical standpoint have engaged the attention of engineers than those involved in the unloading and subsequent handling of ore and coal from vessel to furnace or consumer, with the necessary stocking and reclaiming. A chief factor to be considered is the difficulty in securing cars to handle cargoes as rapidly as they are taken from the holds. Among the devices offered the automatic grab bucket or clam shell has proven well adapted to the work. In many cases older vessels are being altered, and new ones are building, so that these buckets can take out from 95 to 98 percent of the entire cargo.

The Jeffrey Manufacturing Co. has brought out a bucket which combines with simplicity and power, great capacity per unit of mass in motion; or in other words the weight of the moving mechanism has been reduced to the minimum per unit of ore handled. Strength has been secured rather by apportionment than the amount of metal used and the result is a bucket long-lived under the rough usage to which these devices are subjected. These buckets have an unusual spread, the one having a capacity of 3 tons of ore being 11 feet overall when open, while the 5-ton bucket opens to 15 feet.

The closing path gives great efficiency and in opening the load is discharged cleanly and completely. Small head room is required, permitting of reaching well under the decks and keeping down the height of the tower. These buckets will handle ore and coal, including run of mine bituminous, sand and limestone, and may be used for dredging and excavating.



JEFFREY GRAB BUCKET.

They have also done good service in handling coal and ashes in power plants and in transporting coal long distances from and to the stockpiles.

Alloys of Nickel and Manganese.

R. A. Hadfield, the head of the well-known Sheffield steel firm, gave a striking illustration of the possibilities of the science of metallurgy at the recent Engineering Conference in the course of a brief communication on the alloys of iron, nickel and manganese, the study of which he has largely made his own. In a former paper he showed that iron of 0.5 percent carbon alloyed with 5 percent manganese produces an alloy of extraordinary brittleness—so brittle, in fact, that it could be readily powdered under very slight pressure when cold, although when heated it could be readily forged; and in a similar way an alloy of iron with about 15 percent nickel is very brittle, though not to the same extent as with manganese. Curiously enough, however, Mr. Hadfield finds that a double combination of nickel and manganese with iron in exactly the same percentages as before gives an extraordinary tenacious alloy with a tensile strength of over 50 tons and an elongation of 30 to 50 percent on 8 inches. The fact that soft iron can have its tenacity trebled and its elongation more than doubled by two elements which when each alloyed separately produce brittle compounds that are practically worthless, affords evidence of the metallurgical resources yet open to engineering construction.—[Mechanical Engineer.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Springfield, O., board of public service has recommended the purchase of a new engine and boiler at the waterworks pumping station and the issuing of $50,000 bonds.

The American Rock, Stump & Tree Removing Co. has been organized at Waterloo, Ia., to manufacture machinery for the removal of rocks, trees and stumps. The main office of the new concern will be in New York City as the majority of the heavy stockholders reside there. The plant will be located at Charles City, Ia. The company now has orders for forty machines to be shipped to Australia, four to Cuba and two to Mexico. The officers are: Jason C. Moore, president, New York; H. T. Smith, vice president, New York; and F. A. Fulghum, superintendent, Charles City.

The Raleigh Foundry & Machine Mfg. Co., Raleigh, N. C., has been incorporated with a capital of $75,000.

J. F. Hogan & Co., capital stock $10,000, have been incorporated at Marion, Ind., to manufacture boiler supplies.

The Poole Engineering & Machine Co. has been organized at Baltimore with a capital of $350,000.

The Mugler's Iron Works, No. 420 East 108th St., New York, have been incorporated with a capital of $12,000.

The Lynn Manufacturers Die Co. has been organized at Portland, Me., with a capital of $10,000. The president is H. W. Woodward and the treasurer is H. L. Cram.

The Rotary File & Machine Co., Brooklyn, N. Y., has been incorporated with a capital of $5,000. The directors are: H. F. Noyes, Brooklyn; B. G. Yung and Keyes Winter, New York.

The Raughley Foundry & Machine Co., Thermal City, N. C., has been incorporated with a capital of $75,000.

The Ohio Valley Steel Foundry Co., of Pittsburg, Pa., has been incorporated to manufacture and deal in steel and iron, capital $150,000. Incorporators: C. G. Robinson, Cincinnati; Thomas A. Watkins, George R. Wallace, J. B. McAdee, B. L. Hirschfield, Pittsburg.

The Acme Lumber Co., Timberland, N. C., wants to buy second-hand 80-horsepower boiler and 20 or 25-horsepower engine.

The Composite Metal Co., L. P. Clark manager, Catasauqua, Pa., wants catalogues of foundry equipment and supplies.

The Mayfield Foundry & Machine Works, Mayfield, Ky., wants to buy new for quick delivery one gas generator, six forges, three power presses, one power cut of shears, all for working one-half inch and five-eighths inch round iron; also wants rope drive between two shops.

Vaughan & Fuller, Winchester, Tenn., are in the market for second-hand lathe about ten or twelve feet between centers.

Asa Snyder & Co., Richmond, Va., want an 8-inch pipe-cutting and threading machine.

The Hammond Boiler Works, Hammond, Ind., has filed articles of incorporation, showing $10,000 capital. The directors are : Oscar F. Broms, William C. McEwen and William J Whinery.

The Lafayette Stamping & Enameling Co., recently incorporated at Coshocton, O., will erect three brick buildings, two 50 x 150 and one 70 x 150 at West Lafayette, O. The company will want boiler, engine, heater and boiler pump, line shafting, pulleys and hangers, and will be in the market in about 30 days for these articles as well as for other machinery. D. A. Raiff, of Coshocton, is president of the new company.

A. K. Wallan has leased the Williams' foundry property at Jackson, Miss., and will install new machinery for manufacture of well-boring outfits, etc.; will also establish blacksmith shop and wagon-repairing works.

H. B. Wordehoff, Plant City, Fla., wants to buy 10-ton second-hand dummy engine and boiler and four miles of relaying T rails, 60-h. p. second-hand return tubular boiler, 30-h. p. second-hand engine, and 125-h. p. return tubular boiler.

Henry Monk, Pensacola, Fla., wants prices on second-hand hoisting engine and boiler.

The Panther Creek Co. (manufacturers' agent), Panther Creek, N. C., wants prices on 50-horsepower plain side-valve

engine and 100-horsepower tubular boiler, f. o. b. Winston-Salem, N. C.

Pioneer Mining & Manufacturing Co., Birmingham, Ala., is in the market for engine lathe with 50-inch swing and strong enough to turn off locomotive tires.

The supervising architect, Washington, D. C., will receive sealed proposals until 3 p. m., Aug. 4, 1903, for the mechanical heating and ventilating apparatus, etc., for the National Bureau of Standards, Washington.

Jacob Cohen, Jacksonville, Ill., is in the market for a shear suitable for cutting sheet scrap, tank iron, pipe, etc., also for an alligator shear for cutting boiler plate, tank iron and iron up to five inches in diameter. New or second-hand shears will be considered. State price and capacity.

The Leetonia Boiler Co., Leetonia, Pa., has increased its capital stock from $5,000 to $15,000. E. M. Peters is president and S. M. Garlach is secretary.

The Bates Forge Co., with a capital stock of $50,000, has been organized at Indianapolis to manufacture and sell metal drop forgings. The directors are: Franklin P. Bates, John A. Glass and Fred W. Rubin, all of Indianapolis, and the plant of the company will be located in that city.

Pittsburg capitalists have organized a company under the laws of Delaware for the manufacture of smoke-consuming devices. The company is capitalized at $1,000,000. The incorporators are: Joseph T. Nevin, Edward A. Richter, Thomas R. Winans, of Pittsburg, and John S. Loder, of Denver, Col.

The Foyer Steel Stamping Co., Painesville, O., has been organized with the following directors: W. B. White, of the White Chewing Gum Co.; A. J. Scheuer, of the Toy Jobbing House of Lehman & Scheuer, of Sandusky; W. P. Engel, president People's Gas & Electric Co. and Defiance Street Railroad, of Defiance,; J. B. Vining, secretary board of public service of Cleveland, and Attorney E. J. Thobaben, of Cleveland. The company will manufacture stamped steel and metal goods such as small steel safes for banks, toy banks, steel wheelbarrows and wagons, bedsteads, etc.

W. H. Landrum, of Rolling Hill, Va., will establish a foundry at Chase City, Va.

The Gunther-Wright Machine Co., Frankfort, Ky., has been incorporated with a capital of $100,000. The incorporators are: W. H. Gunther, J. S. Wright and J. L. Neubauer.

R. E. Briggs, of Amesbury, Mass., and associates, have incorporated the Southern Car Co., with paid-in capital of $60,000 and authorized capital of $250,000, with headquarters at High Point, N. C. All kinds of passenger, freight and small cars for both steam and electric roads will be manufactured.

The United Iron Works, Oakland, Cal., have been incorporated with a capital of $500,000, of which $500 has been paid in, to do a general foundry business.

A company is being organized by prominent citizens of Cincinnati to engage in the manufacturing of cars. The promotors are: W. Kesley Schoepf, J. G. Schmidlapp, A. B. Voorheis, Thomas P. Egan, R. A. Koehler, William H. Stewart, Jr., and others. The company will be capitalized at $500,000, of which $300,000 has already been subscribed. The company will manufacture interurban cars of improved type, and expects to be ready for operation about Nov. 1.

New Construction:—

Greenlee Bros., Rockford, Ill., will build a foundry, forge shop and a tool shop. The foundry will be 169x500 feet, and an effort will be made to complete the plant before winter.

The Louisville & Nashville Railroad Co. is completing a large forge shop as an addition to its shops at Birmingham, Ala. The Louisville & Nashville shops at Birmingham have been enlarged during the past few years, and now they have the largest railroad shops south of Louisville, Ky.

The Victor Adams Mfg. Co., Little Falls, N. Y., whose increased capital stock has been mentioned, expects to enlarge its plant, but is not yet ready to announce details.

The Beaver Valley Metal Co., Beaver Falls, Pa., will erect a 35-foot addition. A large crane will be installed.

The Russell & Erwin Co., formerly the Corbin Mfg. Co., of Dayton, O., will increase its plant by the erection of new buildings so that the six acres, owned by the company in North Dayton, will be almost entirely covered. The capacity for the manufacture of screws is to be tripled, and the new buildings will be constructed as soon as contracts can be let and the material obtained.

The contract for the new machine shops of the firm of E. M. Burr & Co., Champaign, Ill., to be erected at a cost of $10,000 has been let.

The Buffalo Foundry Co., Buffalo, has filed a mortgage of $100,000 to secure a bond issue. Every department of the concern is being enlarged and the capital stock will soon be increased to $500,000.

The Chicago, Milwaukee & St. Paul railroad car shops in West Milwaukee, Wis., are now able to build seventy-five locomotives a year in addition to making repairs. The blacksmith shop has been extended by a single storied structure 70 feet by 200 feet long, a wing 70 x 100 feet has been added to the boiler shop and other additions have been made.

About 200 men are employed in building the new coal dock and coke ovens for the Zenith Furnace Co., Duluth, Minn. Grading work on the railroad tracks leading to the new dock and ovens has been completed, 3,000 piles having been driven for the foundation. A half million feet of plank for the floor of the dock have been ordered for delivery by August 1.

Just two and one-half months elapsed between the breaking of ground and the starting of machinery by the Smalley-Motor Co., Ltd., Bay City, Mich. Two buildings, a machine shop 50 x 20 feet and a foundry 50 x 125 feet, were erected. The output is exclusively marine gasoline engines and attached parts.

Wilson & Seay, of Lynchburg, Va., have contract for building an addition to machine shops of Norfolk & Western Railway Co. at Bluefield, also for erecting new scalehouse and signal tower costing $5,000 and $6,000, respectively.

The Merrill-Stevens Engineering Co., Jacksonville, Fla., machinist and shipbuilder, will change name to the Merrill-Stevens Co., incorporated with capital stock of $500,000. Company will build additions to its plant.

The Bredin Gas Engine Co., Butler, Pa., will erect a plant for the manufacture of gas engines. The company has a patent on a gas engine tube.

The Jarvis Engine & Machine Works, Lansing, Mich., have begun work on a new machine shop which will be erected at a cost of $6,000.

The Vipond Construction Co., Altoona, Pa., has been awarded the contract for the erection of the new Pennsylvania Railroad wheel foundry at Burket Station. The building will be composed almost entirely of steel and will be 602x226 feet.

Cramp & Co., Inc., of Philadelphia, have been awarded the contract for the erection of a shrapnel shop at Frankford Arsenal, at a cost of $40,000. The building will be a two and three story brick and steel structure of fireproof construction, 54x143 feet.

W. W. Wainwright has leased a site at Connersville, Ind., for 99 years for a company which will erect a building to manufacture punches, shears and rolls.

Hiram Freidenwald will build a foundry two stories, 63x137 feet, in Baltimore, Md.

The Dangler Stove & Mfg. Co., Cleveland, will erect a brick addition, one story, 50x76 feet.

The contract for the new plant to be erected by the American Ball Bearing Co., Cleveland, has been let. It calls for the erecting of the following buildings: A power house, 40 feet by 216 feet; a saw tooth factory building, 200 feet by 168 feet, and a three-story building, 40 feet by 120 feet.

The Forest City Steel & Iron Co., Cleveland, will erect an addition 110x192 feet.

Ground was broken last week for the large new buildings of the Foster Stove Co. at Ironton, O. When the buildings are completed, the company will have greatly increased facilities and a larger output.

Fires and Accidents:—

The Hornellsville Foundry Co.'s plant at Hornellsville, N. Y., was destroyed by fire July 8. Patterns valued at $27,000 were destroyed. The loss on the building was $20,000.

Fire at the plant of the Cuyahoga Stove Foundry Co., Cleveland, July 12, caused a loss of $7,000.

The main building of the Wood Shovel & Tool Co., Piqua, O., was entirely destroyed by fire July 11. Some of the work-

men had narrow escapes from being burned. Loss $35,000. The plant had been in operation only eight months.

Fire at the Standard Steel Works, Lewiston, Pa., a branch of the Baldwin Locomotive Works, destroyed a considerable section of the axle plant, causing a loss of $25,000, covered by insurance.

Fire on July 9 damaged Milliken Brothers' boiler and blacksmithing plant, Brooklyn, N. Y., to the extent of $10,000.

General Industrial Notes:—

The S. Obermayer Co., of Cincinnati and Chicago, manufacturer of foundry facings and equipment, has secured the contracts for the entire foundry equipment of the new technical school of the University of Chicago. The company has also secured contracts for the entire foundry equipment of the "Crane" school of the city of Chicago. In these contracts are included complete outfits for both brass and iron foundries. Contracts are to be completed for the opening of the school term, Sept. 1.

W. T. Hall has purchased a site at Prescott, Ariz., and will erect a general machine and repair shop. He is now in the East purchasing machinery.

William Field and William Shorb have purchased the Leader Mfg. Co.'s machinery at Decatur, Ill. They will organize a stock company with a capital of $30,000 to manufacture boilers, do boiler repair work, and later take up the manufacture of gasoline engines.

The application for the charter for the Shenango Iron & Steel Co., Sharon, Pa., will be made July 18.

The H. S. French Machine Co., Cleveland, recently incorporated, has its building completed and machinery purchased. Tools bought are for a general machine shop, and for the present the company will do only a general jobbing machine business.

The Flexible Shaft & Tool Co., Bellefontaine, O., recently incorporated, has erected a building, and machinery has been installed. The company is now manufacturing its flexible shafts with plug bit and screw driven attachments.

The Davies Car Wheel Co., whose organization has been noted, will build a plant at Moundsville, W. Va. The plant will be as modern in its appointments as any of its kind in the country. It will manufacture the Davies boltless steel tired car wheels, the Davies interlocking key car wheel and charcoal chill tread traction car wheel and other railroad specialties. The company was organized and promoted by the Wheeling Board of Trade.

The W. N. Durant Co., successor of W. N. Durant, manufacturer of counting machines, Milwaukee, Wis., is not yet prepared to announce its plans for building. The business of the concern has been growing rapidly the past few years.

The new 40-inch blooming mill at the Minnequa steel works of the Colorado Fuel & Iron Co. is now in operation. The mill was designed by the Garrett-Cromwell Engineering Co., Cleveland.

General L. M. Openheimer, chairman of the penitentiary board of the State of Texas, by whose permission experiments in iron making have recently been in progress at the Rusk penitentiary, states that the iron properties at Birmingham, Tex., have been purchased by Pittsburg capitalists, and that the work of developing will soon be started. The experiments made at the penitentiary are said to have been very satisfactory and encouraged capitalists to invest in the Texas property.

The Elliott Machine Co., Baltimore, has the contract to furnish the steel tower at Fort Colcum, N. Y., for the United States government. The bid was $6,620. The same company will furnish seven chain ammunition hoists to the United States engineer at Boston.

The Dominion Steel Whiffletree Co., of Leamington, Ont., will establish a plant at Ypsilanti, Mich.

The new plant of the Herron-Brady Pump & Foundry Co., Chattanooga, Tenn., is now in operation. The company is said to have on hand orders to foot up $60,000.

A. N. Eaton, of Peabody, Kas., will establish a plant in Omaha, Neb., for the manufacture of galvanized iron stock tanks. At present Mr. Eaton is doing a prosperous business in Peabody, but desires to extend it to other places.

The Baltimore Rolling Mill Co. has tested its machinery at its new plant at Canton, Md., by rolling its first bar iron. The work was entirely satisfactory.

The Baldwin Locomotive Works, Philadelphia, closed the first half of the year by turning out the 1,000th engine made since Jan. 1. This is the greatest record ever made by any locomotive works and is but 533 short of the entire output of last year. The company has orders that will keep it busy to its full capacity well into 1904, and it is expected that the output of the present year will be 2,200 locomotives.

Joseph Goldburg, of McKeesport, Pa., has purchased the plant of the McKeesport Machine Co., and the latter company has gone out of business.

The Haldman-Crossley Machine Co., a branch of a Salem, O., concern, has leased a plant at Defiance, O., and will manufacture blacksmiths', carriage-makers' and butchers' tools.

John F. Allen, 370-372 Gerard Ave., New York City, reports May shipments of Allen riveters as follows: American Car & Foundry Co., Berwick, Pa., two riveters; H. W. Peabody & Co., for Paris, France, two; Manitowoc Steam Boiler Works, Manitowoc, Wis., one; Cleveland Crane & Car Co., Wickliffe, O., one; Virginia Bridge & Iron Co., Roanoke, Va., two; American Paving & Contracting Co., Philadelphia, one; Lauer & Harper Co., Baltimore, one; Fletcher & Crowell, Portland, Me., one; Tennessee Coal, Iron and Railroad Co., Birmingham, Ala., one; Westinghouse Electric & Mfg. Co., Pittsburg, one; Canadian Shipbuilding Co., Toronto, one. The above list embraces only complete machines.

The Wausau Foundry & Machine Shops, Wausau, Wis., recently incorporated, has already installed new machinery such as is used for iron work and intends to put in another milling machine and lathe as soon as it has the floor space. The company is at present building an addition to the shop. The main object will be to manufacture new patent butter print machinery which is said to be something entirely new in the market. The company also manufacturers feed cuters, drag saws and mill machinery.

The Cleveland Foundry Co. has recently added to its equipment a Westinghouse, 100-kilowatt, 250-volt, engine-type generator, and fourteen direct-current motors, ranging in capacity from 5 to 30-horsepower, together with the necessary switchboard and auxiliary apparatus. The Corlett Engineering Co. is the engineer.

The United Iron Works Co., with headquarters at Springfield, Mo., formed recently by the consolidation of the Crescent Iron Works, Springfield, Mo.; Sterling Iron Works, Springfield, Mo.; Aurora Foundry and Machine Works, Aurora, Mo., and Aurora Foundry and Machine Works, Iola, Kan., has purchased outright the complete plant and stock of the Pittsburg Foundry & Machine Co., of Pittsburg, Kan., and will operate same in connection with the other properties. The officers are: C. H. Cole, president; H. T. Hornsby, vice president and general manager; R. P. Bowyer, secretary; A. C. Daily, treasurer; C. C. Mathey, general superintendent; A. M. Fowler, assistant general superintendent.

William White & Son, of Dayton, O., will establish a jobbing foundry and machine shop in Gadsen, Ala. They have been in the foundry business in Dayton for a number of years.

The plant of the Page Woven Wire Fence Co. at Monessen, Pa., closed for repairs July 3 and will not be started until August 17.

A special meeting of the stockholders of the Norwalk Lock Co., Norwalk, Conn., was held recently, at which a plan for financing the concern and resuming operations was considered. It was decided to reduce the capital stock from $230,000 to $76,000, and provide working capital by the issue of new preferred capital stock equal to the amount of common stock retired. It is expected that this stock will be sold, and that the plant will soon be in operation.

The machinery of the plant of the Terre Haute Shovel & Tool Co., Terre Haute, Ind., recently sold to the Ames Tool Co., is being prepared for shipment to other cities where the purchasing company has plants. The buildings will be made vacant for some other company to use.

The Columbia Engineering Works, Inc., Brooklyn, N. Y., have taken up the manufacture of the Herschmann patent steam wagons, and the automobile department has been equipped with tools specially designed for the building of three-ton and six-ton capacity trucks.